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ABSTRACT

Part of an Economic Education Series, the course package is designed to teach basic concepts and fundamental principles of macroeconomics and how they can be applied to various world problems. For use with college students, learning is gained through lectures, discussion, simulation games, programmed learning, and text. Time allotment is a 15-week semester. The guide is divided into five parts. Part I describes the package, including educational objectives emphasizing analysis and decision making, course content, teaching techniques, and organization. Part II presents charts for the course management plan. Part III offers four course unit outlines which define, explain, and give examples of basic macroeconomic concepts: a simple model of income and expenditure determination; aggregate demand, unemployment, and inflation; and an expanded model for policy making. An objective question bank for the units contains 39 multiple choice questions. Part IV introduces sample games material, using a simulation model of the economy with the student acting as a policy maker trying to avoid unemployment and inflation. Part V suggests eight student questionnaires and tests, five of which are general and appear in the Micro TIPS-Cases-Programmed Learning Course Package (SO 011 932). The remaining three test macroeconomics knowledge and include a 50-question multiple choice comprehension pretest, a 35-question multiple choice midterm, and a final examination of 19 multiple-choice questions, two cases, and two essays. (CK)

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HERIOT-WATT UNIVERSITY, EDINBURGH

The Macro - Games Course Package

THE ESMÉE FAIRBAIRN RESEARCH CENTRE
Department of Economics

SO 011 930

The Esmée Fairbairn Research Centre, TEFRC, was established in 1970 and grew out of the Economics Education Project which was concerned with analysing how economics was being taught in schools, polytechnics, colleges and universities in the United Kingdom. Since its establishment, the Centre has undertaken several studies in the United Kingdom and United States of America, focussing mainly on efficiency in higher education.

Beginning in 1975, the principal research activity of TEFRC will be evaluating the cost effectiveness of alternative systems of instruction in higher education and assessing the likelihood of their diffusion in different institutional settings.

The Research Centre is part of the Department of Economics at Heriot-Watt University. The Director is Professor Keith G Lumsden.

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The Macro - Games Course Package

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*These items appear in The Micro TIPS-Cases-Programmed Learning Course Package. They will be modified where necessary for the different course packages.

1 Description of Course Package

1.1 Distinguishing Features

For this course the playing of the macro-economics policy games is an integral activity which assumes major importance to the instructor, teaching assistant, and student. A significant portion of both class and study time is devoted to analysis and decision-making in the context of the game. The language and analytical techniques developed in the games are entirely consistent with those of the lectures, readings, etc. As the course develops in complexity so do the games. The analysis and decision-making required of the student playing the game constitutes an application of the concepts developed in the lectures and readings. Consequently, there's a profound interaction between the games and other teaching techniques.

In order that students gain an immediate overview of the entire course material and can, therefore, put the formal analytical techniques and the game related activities in meaningful perspective, they are required to work intensively through a complete macro-economics programmed text in the first two weeks. At the end of this period they are given the first mid-term and begin to play the games. Each discussion section is devoted to review of games experiences and integration of these with lectures and readings and with real world events.

1.2 Course Content

This course concentrates on the basic concepts and fundamental principles of macroeconomics and considers how these principles can be applied to various real world problems. The major core topics are listed below.

Macro Unit	Core Topic
1	Basic Macroeconomic Concepts
2	A Simple Model of Income and Expenditure
3	Aggregate Demand, Unemployment, and Inflation
4	Using the Expanded Model for Policy Making
5	Investment, Money and Interest
6	Monetary Policy
7	Aggregate Supply
8	Long-term Growth
9	International Macroeconomics

Section 3 of this package consists of a detailed outline of each unit.

1.3 Teaching Techniques

The teaching techniques incorporated in this package include: macroeconomic policy games, lectures, discussion sections, programmed learning, and conventional text.

1.4 Course Organization

The course is designed for a 15 week semester with two lectures and one discussion section per week. Each week, in addition to attending lectures and discussion sections and completing reading assignments, students will play the macroeconomic policy games on the computer. It is assumed that each student will spend at least two hours studying and playing the games for each contact hour. Students will be evaluated by performance on two mid-terms and a final examination. The mid-terms will consist of objective multiple choice questions, the final of objective, essay, and case questions.

1.5 Experiment Requirements

To assess the efficacy of each of the teaching techniques on different types of students, it is necessary to collect data on student and teacher characteristics. Students will be given a pre-test in economics and asked to complete a psychological inventory. In addition they will be asked to complete questionnaires at the beginning, throughout, and at the end of the course.

1.6 Impact on Pilot Institution

This course will be implemented at the University of California, San Diego, in one of three lower division sequences. Enrollment in this sequence is ordinarily about 200 students. While macroeconomic policy games have been used in a peripheral way at UCSD, a course that is focussed around the games teaching technique has never been tried before.

2 Course Management Plan

To measure the efficacy of various teaching techniques on different types of students it is essential that a common core of economics materials is taught to all students involved in the experiment and that the teaching faculty adhere to a rigorous course schedule.

To achieve the former a detailed course outline including applications and examples has been prepared for the instructor. Section 3 contains the detailed course outlines for Macro Units 1 - 4, approximately one-half of the course. The course management plan follows.

Course Management Plan - Macro-Games Course

	Week 1		Week 2		Week 3	
	Lecture 1	Lecture 2	Lecture 3	Lecture 4	Lecture 5	Lecture 6
LECTURE CONTENT	Pre-Test in Macroeconomics Pre-Test in Basic Mathematics	Introduction and Overview Discussion of Teaching Techniques Student Factual Questionniare	MACRO UNIT 1: Basic Macroeconomic Concepts 1.1 Underlying Microeconomic Behavior	1.2 National Income and Product Accounting	Mid-term examination(1) Distribute Instructions for Playing the Game	1.3 Nominal, Real, Actual and Potential GNP
READINGS	Attiyeh, Lumsden, Bach: Macroeconomics Bach: Economics		Attiyeh, Lumsden, Bach: Macroeconomics Economics: 1 - 3	Economics: 7, 8		Economics: 9
TUTORIALS	Psychological Inventory		Remedial Tutorial in Basic Mathematics		Mechanics of Computer and Review of Mid-term examination (1)	
COMPUTER SIMULATION AND RESEARCH PROJECTS					MSG 1, Run Quarters 1 - 4	

Course Management Plan (cont'd)

	Week 4		Week 5		Week 6	
	Lecture 7	Lecture 8	Lecture 9	Lecture 10	Lecture 11	Lecture 12
LECTURE CONTENT	1.4 Economic Policy	MACRO UNIT 2 : A Simple Model of Income and Expenditure Determination 2.1 Structure of the Model	2.2 Solving the Model	2.3 Interpreting the Model	MACRO UNIT 3 : Aggregate Demand, Unemployment and Inflation 3.1 Aggregate Demand Relative to Potential GNP	3.2 Unemployment and Inflation
READINGS		Economics: 10 Course Notebook Problem 2A	Economics: 11 Course Notebook Problem 2B, C		Economics: 12. 13	Economics: 14. 19
TUTORIALS		Review of Run, Quarters 1 - 4	Review of Course Notebook Problems, 2A, B, C Review of Run, Quarters 5 - 8			Review of Run, Quarters 9 - 13
COMPUTER SIMULATION AND RESEARCH PROJECTS	MSG 1 (cont'd), Run Quarters 5 - 8		MSG 1 (cont'd), Run Quarters 9 - 13		MSG 1 (cont'd), Run Quarters 14 - 18	

Course Management Plan (cont'd)

	Week 7		Week 8	
	Lecture 13	Lecture 14	Lecture 15	Lecture 16
LECTURE CONTENT	MACRO UNIT 4 : The Expanded Model for Policy-Making 4.1 Fiscal Policy	4.2 The Balanced Budget Multiplier	4.3 Choosing the Size of the Budget Deficit or Surplus	4.4 Endogenous Taxes
READINGS	Economics: 15 Course Notebook Problem 4A	Economics: 16 Course Notebook Problem 4B	Course Notebook Problem 4C	Course Notebook Problem 4D
TUTORIALS	Review of Run Quarters 14-18		Review of Run, 2, Quarters 1 - 20 Review of Course Notebook Problems 4A, B, C, D	
COMPUTER SIMULATION AND RESEARCH PROJECTS	MSG 2 Run Quarters 1 - 10		MSG 2 (cont'd) Run Quarters 11 - 20	

3 Course Unit Outlines and Question Banks

The course outlines have been prepared in considerable detail so that no ambiguities can exist in the concepts which must be included in the course. In addition, to assist the instructor, examples and applications of each concept have been added; the instructor may substitute his own examples but should not omit any of the topics.

MACRO UNIT 1

BASIC MACROECONOMIC CONCEPTS

1.1 Underlying Microeconomic Behavior
1.2 National Income and Product Accounting
1.3 Nominal and Read GNP; Actual and Potential GNP
1.4 Economic Policy

LECTURE OUTLINE

1. BASIC MACROECONOMICS CONCEPTS

1.1. Underlying Microeconomic Behavior

1.1.1. Demand and supply

a. Macroeconomics is concerned with the aggregates of quantities and prices such as total output of goods and services, employment, and the average price level. In order to understand how the values of these aggregate variables are determined it is necessary to keep in mind how individual markets function. In particular, it is important to understand what determines the price and quantity of goods and services and how price and quantity respond to changes in those determinants.

b. The **transactions** between buyers and sellers of a **commodity** make up what economists call the market for that commodity. The quantity bought and sold and the **price** of the commodity are determined in that market.

Definitions: **Commodity** -- any good or service which directly or indirectly satisfies a human want.

Transaction -- the exchange of one commodity for another, one of which is usually money.

Price -- the number of dollars that is exchanged per unit of another good in a market transaction.

Examples: A market can exist in one location, such as the stock market on Wall Street or the wheat market in Chicago. Or a market can be widely dispersed geographically, such as the retail food market.

c. The behavior of buyers can be described in terms of a market **demand curve** which shows the quantities that the aggregate of buyers would be willing to buy at alternative prices. A demand curve is derived by plotting pairs of points that indicate a particular price for the good in question and the quantity of the good which would be purchased at that price. Ordinarily, the demand curve is downward sloping, indicating that buyers would be willing to buy more of the commodity at lower prices, other things held constant. The position of the demand curve for a commodity will be influenced by variables other than price, such as buyers' incomes, the prices of related commodities, etc., which influence the amount buyers would demand at each price. Although many factors influence the quantity of autos consumers will want to buy, a demand curve isolates the effect that price alone will have on automobile purchases. The demand curve shows quantities of autos that would be purchased as the price varies, assuming that the value of all the other factors which influence auto demand are held constant. If the value of any of these other factors were to change, the position of the demand curve would also change.

Examples: *Two demand curves for automobiles are shown in Figure 1.1. They are downward sloping, indicating the inverse relationship between price and quantity demanded. Curve D^1 shows automobile demand when the price of gasoline is high. D^2 shows a greater demand for automobiles when there is a lower price of gasoline. Notice that at each and every possible price, more cars are demanded with curve D^2 than with curve D^1.*

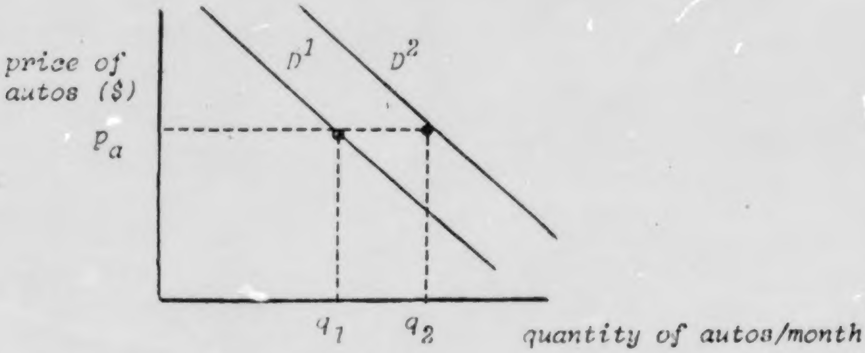


Figure 1.1

d. Seller behavior can be described in terms of the **supply curve** which shows the quantities that the aggregate of sellers would be willing to sell at alternative prices. We construct a supply curve by plotting pairs of possible prices and the quantities which sellers would be willing to offer at those prices. Usually, the supply curve is upward sloping, indicating that sellers would be willing to sell more at higher prices, other things held constant. The upward slope is consistent with the notion that the more of a commodity that is produced, the higher is the production cost per unit. The position of the supply curve of a commodity will depend upon variables other than price, such as the prices of other commodities used to produce it, the technology used to produce it, etc., which influence the amount producers would be willing to sell at any particular price. As the values of these factors change, the position of the supply curve will change.

Example: *Two supply curves for clothing are shown in Figure 1.2. They are upward sloping, reflecting the fact that at higher prices sellers are willing to supply more.* S^1 *shows supply when the wage (price) of garment workers' labor is high.* S^2 *shows a greater supply when that wage is lower. Notice that at each and every price, more clothing is supplied with curve* S^2 *than with curve* S^1.

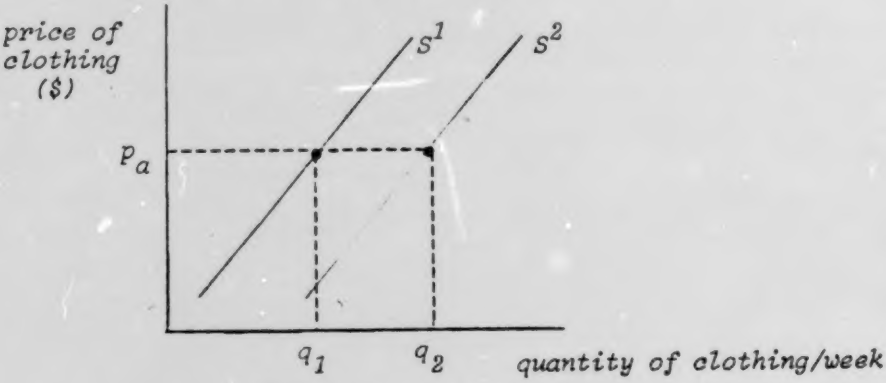


Figure 1.2

1.1.2. Market equilibrium

a. If a market functions properly, buyers and sellers are aware of the prices at which transactions take place. In the absence of any change in the factors which determine the positions of the demand and supply curves, there is a tendency for the market price to converge to a unique level. This is because buyers want to make transactions at the lowest and sellers at the highest possible price. When sellers who would initially be willing to sell the commodity at a relatively low price observe transactions taking place at higher prices, they will no longer be willing to sell at those lower prices. When buyers who would initially be willing to buy the commodity at a relatively high price observe transactions taking place at lower prices, they will no longer be willing to buy at the higher price.

Example: *Suppose you wanted to buy a particular brand of stereo receiver very much and would be willing to pay as much as $300 for it. If you observed other transactions for that receiver being made at a price of $200, you would be foolish to buy it for even $250 if someone offered it to you for that price.*

b. In order for the market price to be at an **equilibrium** it is necessary that the quantities demanded and supplied at that price be equal. That is, the equilibrium market price must be where the supply and demand curves intersect. In Figure 1.3 below the equilibrium price is p^*. If the market price is p^*, then the amount that buyers want to buy and the amount that sellers want to sell are equal. Every buyer who is willing to pay p^* will be able to find a seller willing to accept p^*. The equilibrium quantity bought and sold is q^*.

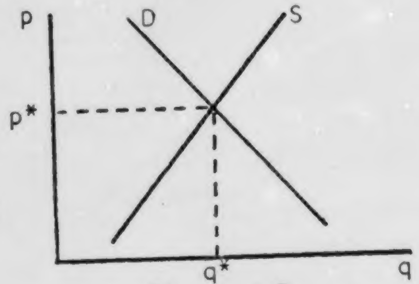


Figure 1.3

Definition: **Equilibrium** -- state of balance at which there is no tendency for the variables involved (e.g., price and quantity of a commodity in a market) to change.

c. Whenever the market price is below p* (e.g., p_1 in Figure 1.4a), there will be **excess demand**. If there is excess demand at the market price, then there are some buyers who are not able to find a seller and who would be willing to offer more than the market price. Since sellers can sell at least as much at a higher price, it will be in their interest to raise the prices. Consequently, when there is excess demand, **competition** among buyers and the desire to get the highest possible price for a given quantity will drive the price up. Only if the excess demand is eliminated will the tendency of the price to rise be eliminated.

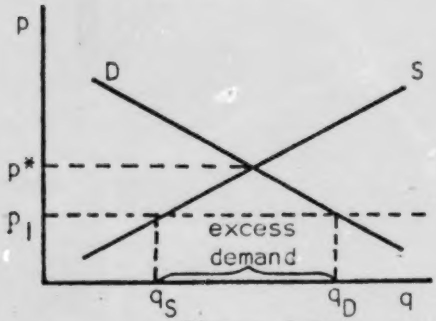


Figure 1.4a

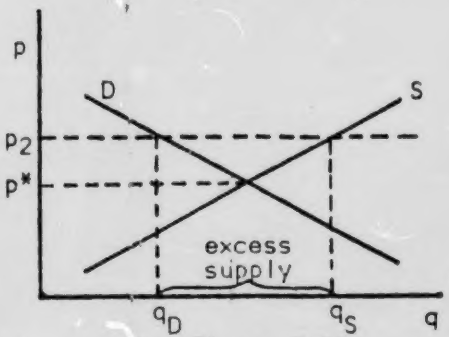


Figure 1.4b

Definition: **Excess demand** -- the situation which exists when, for a given price, the quantity that buyers demand exceeds the quantity that sellers supply.

Competition among buyers -- the effort of buyers to secure a commodity from a seller by offering, when necessary, a higher price than other buyers.

Example: During the oil embargo when the supply of gasoline was reduced, there was an excess demand for gasoline at the pre-embargo price. As a consequence competition among buyers and the willingness of suppliers to accept higher price led to a rise in the price.

d. Whenever the market price is above p^* (e.g., p_2 in Figure 1.4b). there will be **excess supply.** If there is excess supply at the market price, then there are some sellers who are unable to find a buyer who would be willing to accept this higher price. Since buyers prefer to purchase a given quantity at a lower price, it will be in the sellers' interests to offer a lower price. As a result, when there is excess supply, **competition** among sellers and the desire of buyers to pay the lowest price for a given quantity will drive the price down. Only when the price reaches p^* will there be no further tendency for it to fall.

Definitions: **Excess supply** -- the situation which exists when, for a given price, the quantity supplied exceeds the quantity demanded.

Competition among sellers -- the effort of sellers to sell a commodity to a buyer by asking, when necessary, a lower price than other sellers.

1.1.3. Equilibrium at a fixed price

a. In the description of markets presented above the price was free to adjust to the forces of supply and demand. When this is the case, the price will rise if there is excess demand and fall if there is excess supply. In some markets, however, prices are not flexible. Price rigidity can exist for any one of several reasons: the price may be fixed by the government, by non-competitive agreements among buyers or sellers, or by long-term fixed price contracts between buyers and sellers.

Examples: *For many years the government fixed the price of many agricultural products in order to maintain the incomes of farmers. In the markets for many types of labor, the wage (price of labor) is fixed by agreements determined in collective bargaining*

b. In markets where the price is fixed, the amounts bought and sold are equal, but the quantities demanded and supplied will usually not be equal. If the fixed price is below the free market equilibrium price, then there will be excess demand as in Figure 1.5. At $\bar{p}$ the amount bought and sold is q_S which is the same as the quantity supplied. However, the quantity demanded is q_D and there is excess demand equal to $(q_D - q_S)$.

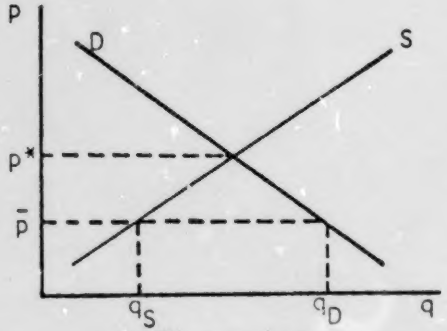


Figure 1.5

Example: *In the market for gasoline during the oil embargo, the government imposed a price ceiling which was below the price where supply and demand would be equal. As a result there was excess demand which was reflected in the long lines of motorists at gas stations.*

c. If a fixed price is imposed in a market at a level above the equilibrium price, then there will be excess supply as in Figure 1.6. At a price of $\bar{p}$ the quantity bought and sold in this case is equal to q_D which is the quantity demanded. However, at $\bar{p}$ the quantity supplied is q_S causing there to be excess supply equal to $(q_S - q_D)$.

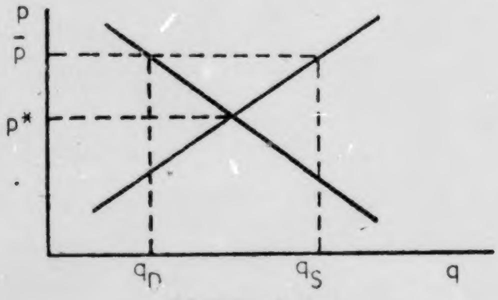


Figure 1.6

1.1.4. Circular flow

a. The economy's population can be considered to be composed of many households, some of which are individuals, the rest of which are families. Each household performs several activities. First, it acts as a consumer in satisfying its current wants. As such it buys goods and services from producers. Second, it is an owner of goods and services which can be used to produce other goods and services. As such it sells goods and services to producers.

Example: *A typical household will buy food, clothing, etc. It will also sell labor services, and perhaps the services of other commodities they own, such as real estate.*

Households may also act as producers, selling the goods and services they produce, and buying productive goods and services from other households.

Example: *A single family farm household acts as consumer, owner of productive resources (land and labor) and producer.*

b. Several households may jointly own businesses which exist for the purpose of using some goods and services to produce others. While these businesses operate separately from households, they act on behalf of those households which own them. Like households which act as producers, businesses buy from and sell to households in different markets.

Example: *Both General Motors and the corner grocer are owned by households. General Motors is owned by many thousands of households, while the corner grocer may be owned by only one. As with most other businesses, both of these operations buy commodities in some markets (e.g., labor services) and sell commodities in other markets (e.g., autos and food).*

Similarly, households may collectively, through the political system, empower the government to use some goods and services to produce others. While the government operates separately from households, it acts on their behalf.

Example: *The government buys labor services, and other goods and services to produce government services such as national defense, police and fire protection, etc.*

c. For a simplified economy it is possible to classify markets into two groups. The markets for goods and services that producers buy from households and the markets for those commodities that producers sell to households. For such a simplified economy, there is a circular flow of income and expenditure among households and producers as shown in Figure 1.7. Households sell services (e.g., labor) to producers which are needed to produce other commodities. In turn they use the income they receive to purchase the goods and services which are sold by producers.

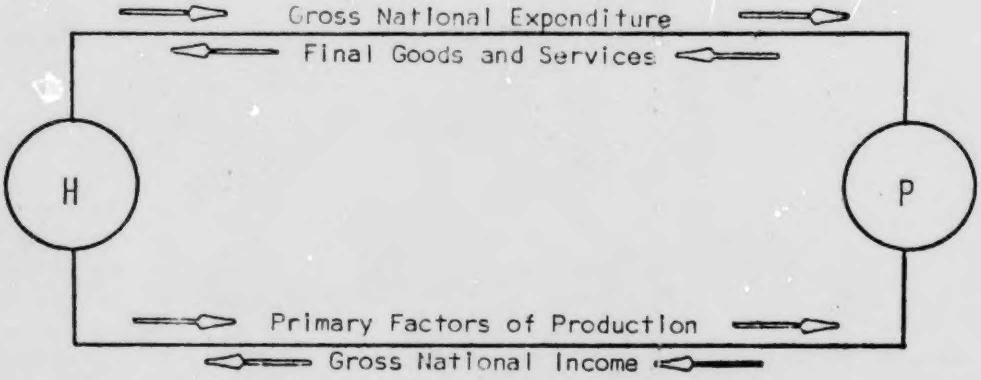


Figure 1.7

1.2. National income and product accounting

1.2.1. Gross national product

a. By observing the circular flow of income and expenditure, it is possible to measure the aggregate **rate of output**. This is the total of all goods and services produced by all producers in a given time period, usually expressed at an **annual rate**. The economy's rate of aggregate output is called gross national product (GNP).

Definitions: **Rate of output** -- the amount of output produced per unit of time.

Annual rate of output -- the amount of output produced per year.

Example: *Frequently, GNP is measured for a quarter of a year (e.g., January through March), but expressed at an annual rate. The reported number is the amount of output that would be produced if the economy continued to produce at that rate for one year.*

b. GNP is the market value of **final** goods and services produced. This can be measured by the expenditure for final goods and services, i.e., gross national expenditure. This value of **intermediate** goods and services is included in the expenditure for final goods and services. To add together the expenditure for final and intermediate goods and services would involve double counting of intermediate goods and services. In computing GNP from expenditure flows, it is therefore necessary to omit intermediate goods.

Definitions: **Final** goods and services -- All goods and services not used up in the production of other goods and services during the time period of observation.

Intermediate goods and services -- Any goods or services used up in the production of other goods and services during the period of observation.

Example: *Consider the output of two commodities, automobiles and steel. Suppose steel is used only to produce autos, and the market value of these goods produced this year was as follows:*

Automobiles	*$30 billion*
Steel	*10 billion*

Because the steel is used up in the production of autos, part of the market value of the autos comes from the steel used to produce them. Consequently, if the value of autos and the value of steel produced are added together, the value of the steel will be counted twice.

c. GNP can be derived in a different manner by adding together the **value added** to aggregate output by each producer. The sum of expenditures for final goods and services is equal to the sum of values added in the production of final and intermediate goods and services.

Definition: **Value added** by a producer -- the value of goods and services produced less the value of the intermediate goods used up.

Example: Consider again the production of automobiles and steel. Suppose that steel is the only intermediate good used in producing automobiles and that no intermediate goods are used in producing steel. The final product and the value added of the auto and steel industries and their combined contribution to GNP are as follows:

	Expenditures of households for final product	Value added in Manufacturing
Autos	30	20
Steel	0	10
Aggregate output	30	30

As can be seen, the aggregate output of autos and steel can be obtained by adding up expenditure for final products or by adding up values added.

1.2.2. Income equals expenditure

a. In addition to the intermediate goods, there are other inputs which are used in the production of an industry's output of final and intermediate goods and services. These other inputs are primary factors of production. They include labor, land (or natural resources), and capital goods.

Definition: Primary factors of production -- All inputs used to produce output in the current period, not including inputs that are themselves produced in the current period.

Example: Labor services are primary inputs because they are used to produce current output, but are not themselves produced. Buildings and machinery produced prior to the current period are primary factors since they are used to produce current output, but are not themselves produced in the current period.

b. The income paid to the owners of primary factors employed by a producer must be financed from the producers' sales receipts. Wages and salaries are paid in return for the use of labor services. Rent is paid in return for the use of land and capital goods not owned by the producer.

23-2

Definition: **Income** -- the payment to the owner of a factor of production in return for the use of that factor in the production of output.

c. The income received by the owners of the business in return for the non-labor inputs they have provided is whatever is left of total receipts after paying for intermediate goods and other primary factors of production. Out of this residual income, the producer must pay interest to those households who may have loaned the owners money to enable them to purchase the land and capital they own. The amount remaining after paying interest is called gross profits.

d. Gross profit is a payment to primary factors that is the residual of receipts after payments for all other inputs have been made. Consequently, the sum of payments by a producer for intermediate goods and for primary factors of production equals total receipts from sales of output. It follows that a producer's value added is equal to the sum of its payments to primary factors. This can be seen clearly by studying the following example.

Example: *Consider the following account of a producer's receipts and payments:*

Receipts		*Payments*	
Sales	*$100*	*Intermediate goods*	*$35*
		Wages and salaries	*30*
		Rent and interest	*15*
		Profit	*20*
Total receipts	*100*	*Total payments*	*100*

Total payments equal total receipts because one form of payment is, by definition, what is left of receipts after all other payments have been made. By subtracting purchases of intermediate goods from both sides, the producer's accounts can be reconstructed as follows:

Sales	*$100*	*Wages and salaries*	*$30*
Less: purchases of intermediate goods	*35*	*Rent and interest*	*15*
		Profit	*20*
Value added	*$65*	*Payments to primary factors of production*	*$65*

The receipts side adds up to the producer's value added. The payments side adds up to the producer's payments of income to owners of primary factors of production.

e. Since GNP equals the sum of producers' values added, GNP is also equal to the sum of producers' payments to primary factors of production. That is, gross national product equals gross national income. Since gross national product also equals gross national expenditure, it follows that gross national expenditure and gross national income are equal. That is, as shown in Figure 1.8, the flow of expenditure for final goods and services equals the flow of income payments for primary factors of production.

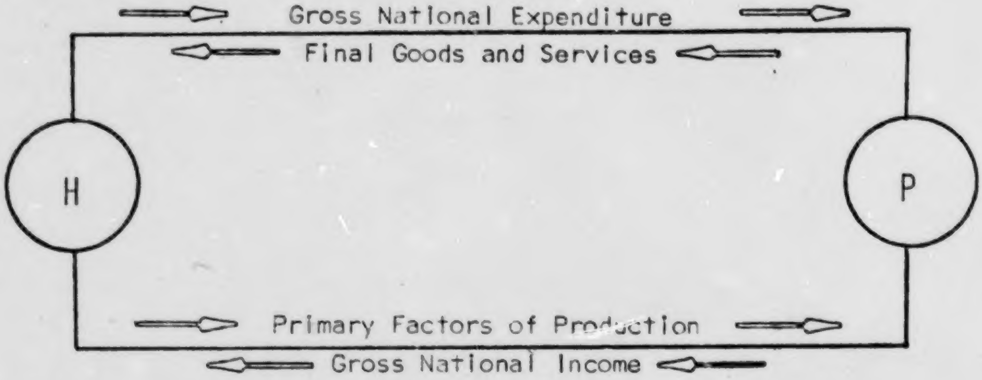


Figure 1.8

1.2.3. Distribution of national income

a. Individually or collectively, all factors of production are owned by households. All labor is directly owned by individual households. Some land and capital goods are owned directly by households. Much of the economy's land and capital goods are owned by businesses, which means that they are owned collectively by the households who are the owners of the businesses. Some land and capital goods are owned by the government, which means that they are owned collectively by all households.

Example: *Ford Motor Company owns the factories used to produce automobiles, but Ford Motor Company is owned by its many stockholders who, therefore, collectively own those factories.*

b. Although the income earned from using those factors of production to produce goods and services (gross national income) ultimately belongs to households who own them individually or collectively, not all of that income is received as **disposable personal income**. Some of it is kept by businesses rather than paid out to their owners. That is, through the business decision-making process the households who own businesses choose to keep part of their income in their businesses to spend collectively. The gross profit of businesses is divided into three parts: **capital consumption allowances**, **undistributed corporate profits**, and **dividends**. Gross profits less capital consumption allowances equals net profits. Capital consumption allowances plus undistributed corporate profits make up what is called business retained earnings. Dividends are an element of disposable personal income.

Definitions: **Disposable personal income** -- the sum of income payments to households available to be spent by individual households.

Capital consumption allowances -- the income payment necessary to cover the cost of depreciation on capital goods used in production.

Undistributed corporate profit -- that part of net profits retained by corporations.

Dividends -- that part of net profits paid out to the owners of corporations.

c. Part of gross national income is paid to the government in the form of taxes. Total tax revenue is composed of household taxes (primarily personal income taxes), direct business taxes (primarily corporate profits taxes), and indirect business taxes (primarily sales taxes). Some of the income received by the government is passed on to households in the form of transfer payments (primarily social security payments and welfare payments). The difference between taxes and transfer payments will be called net taxes.

d. Gross national income is divided among disposable personal income, business retained earnings, and net taxes, as can be seen in the following table.

Disposable personal income = wages, salaries, rents, interest
+ dividends
- taxes
+ transfer-payments

Business retained earnings = net profits
+ capital consumption allowances
- direct business taxes
- dividends

Net taxes = indirect business taxes
+ direct business taxes
+ personal taxes
- transfer payments

Put another way the disposable income of households equals gross national income less business retained earnings and net taxes. This distribution of spendable income among households, businesses and government can be seen by studying the income half of the detailed circular flow diagram shown in Figure 1.9.

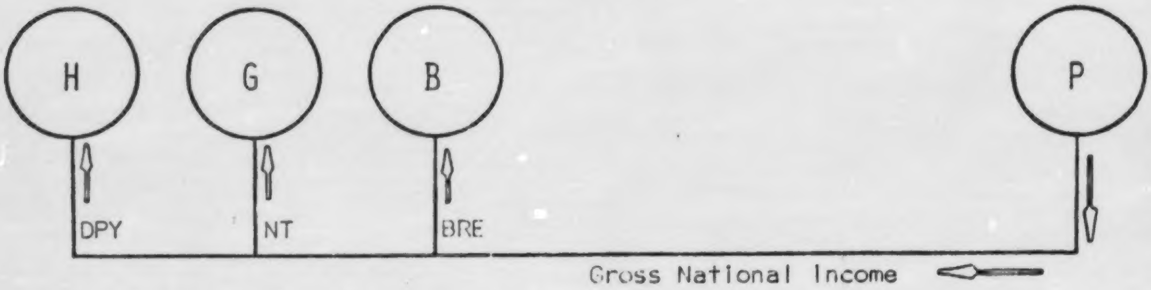


Figure 1.9

1.2.4. **Components of total expenditure**

a. The bulk of total expenditure for final goods and services takes the form of **consumption expenditure**. Any personal disposable income not used for consumption expenditure is called **saving**. Household saving is made available to government and businesses, through households' acquisition (directly or indirectly through financial institutions) of financial instruments such as government bonds and corporate stocks and bonds.

Definitions: **Consumption expenditure** -- the purchase of goods and services, such as food and electric power, by individual households to satisfy wants in the present.

Saving -- income received in the current period, but not used for consumption expenditure; saving increases households' capacity to satisfy wants in the future.

Example: *In 1975 households had disposable income of $1081 billion and spent $973 billion for consumption of goods and services. Their saving of $108 billion was used to accumulate financial assets whereby their saving was made available to government and business to spend.*

b. Just as businesses may act on behalf of households as producers, they may act on behalf of households in purchasing newly produced productive assets. Consequently, a second component of gross national expenditure is **gross investment expenditure**. This takes several different forms: business plant and equipment, residential construction, and inventory accumulation.

Definition: **Gross investment expenditure** -- businesses' purchases of goods not used up in production in the current period.

Example: *In 1975 gross investment expenditure amounted to $184 billion.*

c. Part of gross investment expenditure is used to replace depreciated capital goods. It will be recalled that capital consumption allowances are the income payments necessary to cover the cost of depreciation on capital goods used in production. Gross investment expenditure minus capital consumption allowances equals **net investment**.

Definition: **Net investment expenditure** -- the amount by which the stock of capital goods increases as a result of purchases of new capital goods (gross investment expenditure) after taking into account the depreciation of existing capital goods (depreciation expense).

Example: *In 1975 gross investment expenditure amounted to $184 billion, while capital consumption allowances amounted to $161 billion. This means that net investment expenditure*

-- the increase in the stock of capital goods -- amounted to only $23 billion.

d. The government may also act on behalf of households in purchasing final goods and services. Therefore, the third component of gross national expenditure is **government expenditure**. This takes the form of collective consumption expenditure (such as national defense spending and police services) and collective investment expenditure (such as construction of highways and public buildings) on behalf of all households.

Definition: **Government expenditure** -- the purchase of final goods and services by government.

Example: In 1975 government expenditure for goods and services was $339 billion, of which $275 billion was financed from net taxes and $64 from household saving.

e. Not all purchases by domestic households, businesses, and government are from domestic producers. Some goods and services are imported from foreign producers. Similarly, not all goods and services sold by domestic producers are purchased by domestic households, businesses, and government. Some are exported to foreign buyers. **Net exports** equals the difference between foreign expenditure for domestically produced output (exports) and domestic expenditure for foreign produced output (imports).

Example: In 1975, exports totalled $148 billion, imports $128 billion, and net exports $20 billion. That is, Americans bought $20 billion less than they sold abroad.

f. Gross national expenditure equals the sum of consumption expenditure, investment expenditure, government expenditures, and net exports. The breakdown of total expenditure among its components can be understood by studying the expenditure half of the circular flow diagram which has been added to the income half shown in Figure 1.10.

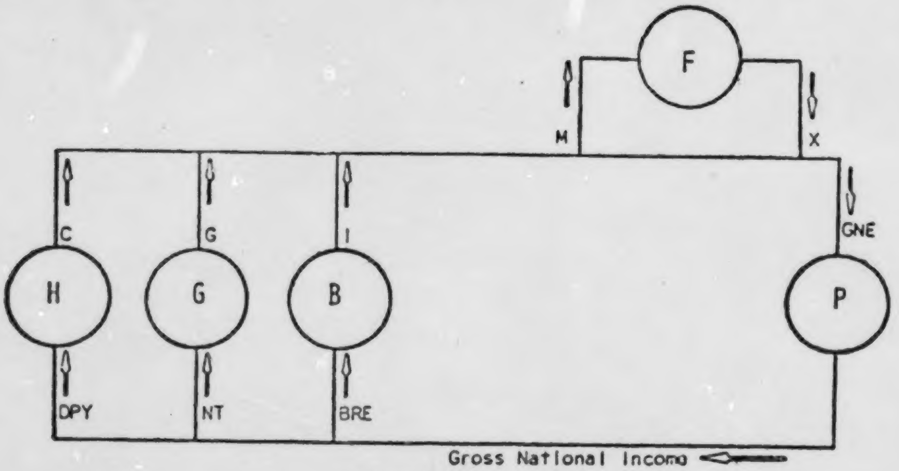


Figure 1.10

Example: *The following table shows the breakdown of GNP into components of expenditure and spendable income for 1975.*

Expenditure	*(billions of dollars)*	*Income*	
Consumption	*973*	*Disposable Personal Income*	*1081*
Investment	*184*	*Business Retained Earnings*	*160*
Government	*339*	*Net Taxes*	*275*
Net Exports	*20*		
Gross National Expenditure	*1,516*	*Gross National Income*	*1,516*

1.2.5. Financial flows between sectors

a. While gross national expenditure and gross national income are equal (See section 1.2.2.e), expenditure and income are not necessarily equal for individual sectors of the economy. But since, in the aggregate, expenditure and income must be equal, an excess of expenditure over income (a deficit) in one sector must be offset by an excess of income over expenditure (a surplus) in other sectors.

b. Usually, the household sector runs a surplus which is called **personal saving**. This income is used to acquire financial assets of some kind, such as currency, bank deposits, government bonds, corporate stocks and bonds, etc. Household purchases of financial assets are frequently called "investment". Sometimes the use of the term "investment", when referring both to personal financial investment and to business investment expenditure, causes confusion. As will be seen below, the two types of investment are not completely unrelated. Personal financial investment in the form of corporate bonds and stocks, for example, provides funds to businesses which are used to make business investment expenditure.

c. For the United States in most years the other sectors of the economy have run deficits. That is, their expenditures for goods and services have exceeded their shares of gross national income. It is possible for these sectors to run a deficit by obtaining the use of personal saving through the sale of financial assets to the household sector. That is, the purchase of these assets by households provides funds to the sectors selling them which are used to purchase goods and services from producers.

Example: *Consider the following components of income and expenditures for the U. S. economy for 1975.*

Sector	*Spendable Income*	*Expenditure*	*Surplus (+) or Deficit (-)*
Households	*1081*	*973*	*+108*
Business	*160*	*184*	*-24*
Government	*275*	*339*	*-64*
Foreign	*0*	*20*	*-20*
National	*1516*	*1516*	*0*

The household sector had personal saving which was offset by the deficits of the business, government and the foreign sectors. These sectors obtained the use of the saved income by selling assets to the household sector assets, such as currency and bonds (by the government) and stocks and bonds (by businesses, both foreign and domestic).

d. Some of the transfer of funds from households to other sectors is made indirectly through financial institutions such as banks, savings and loan associations, etc. That is, households deposit personal savings in a bank or other institution which in turn acquires financial assets from businesses or the government.

e. The financial flow of funds between sectors can be summarized in terms of the dashed lines in the circular flow diagram shown in Figure 1.12:

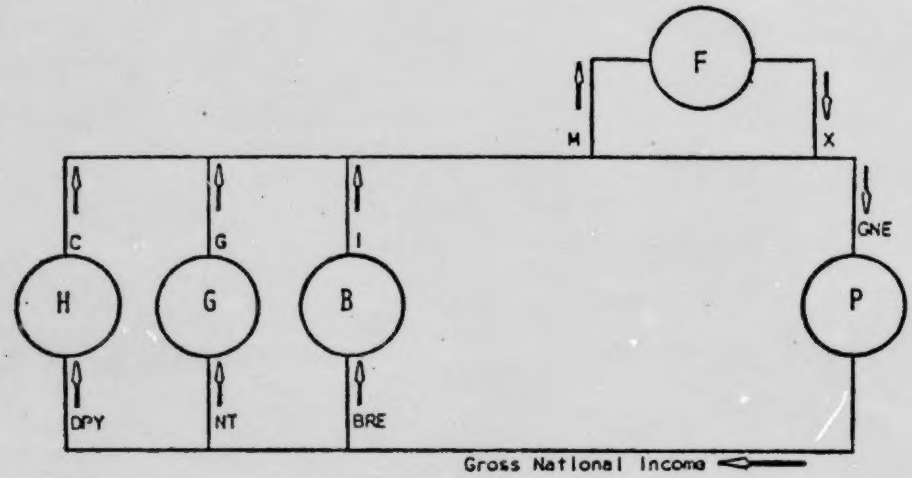


Figure 1.11

1.3. Nominal and Real GNP; Actual and Potential GNP

1.3.1. Real GNP

a. The concept of GNP discussed in section 1.2 uses expenditure for final goods and services to obtain a measure of total output. Implicitly, different goods and services are counted by weighting each unit in proportion to its price so that GNP is the sum over all final goods and services of the price times the quantity of each. By weighting each commodity by its price, GNP counts each output in proportion to what buyers are willing to pay, i.e., in proportion to its value to buyers. Thus, GNP is a measure of the value of buyers of output produced.

Example: *If there were two goods, a and b, then GNP would be measured as follows:* $GNP = p_a q_a + p_b q_b$. *If GNP were measured by simply adding quantities produced, i.e.,* $GNP = q_a + q_b$, *then a piece of bubble gum would be counted to be as much output as a television set.*

b. One of the principal purposes for obtaining measures of national output is to make comparisons over time., i.e., to determine if, and by how much, output has increased or decreased. As defined above, GNP is not useful for this purpose, because it does not distinguish changes in the quantity of goods and services produced from changes in the prices of goods and services produced.

Example: *If the quantities of all goods and services remained unchanged from one year to the next, then national output would be unchanged. If, however, the price of each commodity doubled over the same period, expenditure for final goods and services would double and, consequently, GNP would double. In this case, the change in GNP is not an accurate measure of the change in national output.*

c. What is required is a measure of output which changes as quantities produced change, but which does not change when prices change. This is obtained by weighting the quantities in different time periods by the same set of prices. Such a measure is called GNP in constant prices, or **real GNP**, as opposed to **nominal GNP**.

Definitions: **Nominal GNP** -- expenditure for final goods and services valued in current prices; sometimes called "money GNP".

Real GNP -- expenditure for final goods and services valued in constant prices.

Example: *Suppose an economy had two goods, apples and bread. Nominal and real GNP could be calculated for two years by using year one prices to value quantities in both year 1 and year 2 as follows:*

	Year 1	*Year 2*
Nominal GNP	$p_{a1}q_{a1} + p_{b1}q_{b1}$	$p_{a2}q_{a2} + p_{b2}q_{b2}$
Real GNP in year 1 prices	$p_{a1}q_{a1} + p_{b1}q_{b1}$	$p_{a1}q_{a2} + p_{b1}q_{b2}$

1.3.2. The average price level

a. From the data for nominal GNP and real GNP for different years it is possible to construct an **index of the average price level** for those years. Such an index would show whether, on average, prices have increased or decreased from one year to another. The value of this index for any year can be obtained by dividing nominal GNP by real GNP for that year. This average price index is called the GNP deflator.

Definition: Average price index -- the ratio of the average price in successive years to the average price in a particular year, called the base year.

Example: *In 1975, nominal GNP was $1,516 billion and real GNP in 1972 prices was $1,191 billion. The value of the GNP deflator for 1975 was 1.27. This means that the ratio of the average price in 1975 to the average price in 1972 was 1.27, or in other words, the average price in 1975 was 27 percent higher than the average price in 1972.*

b. Computing the GNP deflator for any year by dividing nominal GNP by real GNP is equivalent to dividing the average price level in that year by the average price level for the base year, using current year quantities to weight prices in both years. This can be seen from the following computations for years 1 and 2, with year 1 as the base year and year 2 as the current year, for two commodities, apples and bread:

$$\text{Average price level year 2} = p_{a2}\frac{q_{a2}}{q_{a2}+q_{b2}} + p_{b2}\frac{q_{b2}}{q_{a2}+q_{b2}}$$

$$= \frac{p_{a2}\,q_{a2} + p_{b2}\,q_{b2}}{q_{a2}+q_{b2}}$$

$$\text{Average price level year 1} = p_{a1}\frac{q_{a2}}{q_{a2}+q_{b2}} + p_{b1}\frac{q_{b2}}{q_{a2}+q_{b2}}$$

$$= \frac{p_{a1}\,q_{a2} + p_{b1}\,q_{b2}}{q_{a2}+q_{b2}}$$

$$\text{Average price index year 2} = \frac{\text{average price level year 2}}{\text{average price level year 1}}$$

$$= \frac{\dfrac{p_{a2}\,q_{a2} + p_{b2}\,q_{b2}}{q_{a2}+q_{b2}}}{\dfrac{p_{a1}\,q_{a2} + p_{b1}\,q_{b2}}{q_{a2}+q_{b2}}}$$

$$= \frac{p_{a2}\, q_{a2} + p_{b2}\, q_{b2}}{p_{a1}\, q_{a2} + p_{b1}\, q_{b2}}$$

$$= \frac{\text{nominal GNP Year 2}}{\text{real GNP Year 2}}$$

Put the other way around, real GNP in the current year is equal to nominal GNP divided by an average price index constructed using current year quantity weights.

Example: *In 1975 nominal GNP was $1516 billion. In the same year the GNP deflator was 1.27 as compared to 1.00 in 1972. GNP in 1972 prices is equal to $1516 ÷ 1.27 = $1192.*

c. The GNP deflator is an average price index for the prices of all final goods and services. There are other price indexes which are frequently used which reflect the average prices for different groupings of commodities. The most frequently used indexes other than the GNP deflator are the consumer price index, for the prices of commodities which consumers buy, and the wholesale price index, for prices of intermediate goods purchased by producers.

Example: *Other price indexes which are frequently used are indexes of stock prices, e.g., the Dow-Jones index, the Standard and Poors index, and others. They show how the prices of shares of stock change from day to day.*

d. An increase in the average price level is called inflation; a decrease is called deflation. When there is inflation, nominal GNP is increasing faster than real GNP. Usually inflation is expressed as a rate of increase per year. That is, if the rate of inflation is 5 percent per year, the average price level is increasing at a rate such that if it continued to increase at that rate for one year the price level would increase by 5 percent in that time.

Example: *From information on prices and quantities of goods produced in any two years it is possible to compute nominal GNP, real GNP, the GNP inflator, and the rate of inflation between the two years. Consider the following data:*

	Year 1	*Year 2*
Bread (loaf)		
quantity	*150*	*100*
price	*$1.00*	*$2.00*
Apples (pound)		
quantity	*700*	*1000*
price	*$ .50*	*$ .40*

Nominal GNP is the market value (price times quantity) of all final goods and services produced using current prices in each year. Nominal GNP was $500 for year 1 and $600 for year 2. Real GNP in first-year prices is the market value of output produced using first-year prices to value the output in each year. By using the first year as the base year, real GNP in the first year must be the same as for money GNP, $500. For the second year, real GNP in first-year prices would be 100 x $1.00 plus 1000 x $0.50, or $600. The GNP deflator is the ratio of money GNP to real GNP in each year. In the first year this must be 1.00. For the second year, the ratio is also 1.00, which means there was no inflation between the first year and the second year.

1.3.3. Potential GNP

a. An economy's rate of output depends on the quantity of labor that is utilized and the **productivity** of labor. The more labor utilized, given its productivity, the higher will be GNP. The higher labor productivity, given the quantity utilized, the higher will be GNP.

Definition: Labor **productivity** -- the output per unit of labor input, usually output per man-hour employed.

Example: *GNP in the United States is greater than in the USSR, even though the U. S. has a somewhat smaller supply of labor, because the U. S. has much higher labor productivity.*

b. The rate of output that would result if the economy's labor were "fully" utilized is called potential GNP. An economy's actual GNP will be equal to its potential GNP only when its labor resources are fully employed. When there is high unemployment of labor, then actual GNP is less than its potential. The difference between actual and potential GNP is sometimes called the GNP gap.

Example: *For 1975, the estimates of real potential GNP (in 1958 prices) was approximately $930 billion, while real actual GNP (in 1958 prices) amounted to $810 billion. Consequently, for 1975 the GNP gap (in 1958 prices) was $120 billion.*

c. Increases in potential GNP occur if there is growth in the labor force or growth in labor productivity. Growth in the labor force can result from growth in population, changes in composition of population, or changes in the willingness of people to work. Growth in labor productivity can be the consequence of growth in the stock of capital goods per worker or technological progress.

Definition: **Labor force** -- the number of persons employed plus the number of persons actively seeking employment.

Example: *Since 1929, the average rate of growth of the labor force has been approximately 1 1/4 percent per year, while the average rate of growth of labor productivity has been about 2 percent per year. This has resulted in an average rate of growth of potential GNP of approximately 3 1/4 percent per year.*

d. In the short run, i.e., in any current period, potential GNP can be regarded as having been already determined by past events. In the long run, when allowance is made for the passage of time and the accompanying technological progress and growth in the labor force and the stock of capital goods, potential GNP can change. Since in the short run potential GNP is fixed, short run economic policy is primarily concerned with the gap between actual and potential GNP. Since in the long run potential GNP can grow, long run economic policy is primarily concerned with whether population growth, investment, and technological progress are occuring at optimal rates.

1.3.4. Unemployment

a. As was discussed above, whenever actual GNP falls short of potential GNP, unemployment is above normal levels. By definition, there can be full employment of labor only when actual and potential GNP are equal. There have been many periods when actual GNP was substantially below potential GNP with resulting high unemployment rates.

Example: *In the great depression unemployment reached as high as 25 percent of the labor force in 1933. In 1975, unemployment was greater than 8 percent of the labor force for the first time since the end of the great depression in 1941.*

b. Full employment is not defined to be zero unemployment. Frequently, full employment is said to exist when the **unemployment rate** is 4 percent. At "full employment" there will normally be some **frictional unemployment** and **structural unemployment.** There is some disagreement as to which unemployment rate -- 3, 4, or 5 percent -- corresponds to "full employment".The amount of frictional and structural unemployment depends on demographic and other variables and may vary over time.

Definitions: **Unemployment rate** -- the percent of the labor force that is unemployed.

Frictional unemployment -- members of the labor force who are unemployed who are in the process of changing jobs, for whom job vacancies exist, and who are qualified to fill those vacancies.

Structural unemployment -- members of the labor force who are unemployed, for whom job vacancies exist, but who are unqualified to fill those vacancies.

Example: *During the 1960's, it was generally accepted that the "full employment" unemployment rate was 4 percent. During the 1970's, many economists believe that increases in frictional and structural unemployment have increased the full employment unemployment rate to 5 percent.*

c. Because accurate data on employment, unemployment and labor force are more easily collected, full employment is usually defined in terms of labor. It should be understood, however, that when there is high unemployment of labor there is also high unemployment of capital goods and land. But since employment of labor and other factors of production tend to fluctuate together, estimates of potential GNP and the GNP gap based on data on employment and unemployment of labor are reasonably accurate.

d. Just as it is possible to have the unemployment rate rise above its full employment level, it is also possible to reduce the unemployment rate below that level. For many years, 4 percent was taken to be the full employment unemployment rate. During that period the normal amount of frictional and structural unemployment was estimated to be 4 percent of the labor force. When the unemployment rate exceeded 4 percent, the number of unemployed workers exceeded the number of vacancies. When the unemployment rate fell below 4 percent, the number of vacancies exceeded the number of unemployed workers.

1.4. Economic Policy

1.4.1. The role of government

a. We have seen already that the government is an active participant in the economy: it makes expenditures for goods and services, it collects taxes, it borrows money. The government can also influence economic events in other ways: it regulates industries, it passes laws affecting the terms on which transactions can take place, and it can influence household and business attitudes by its pronouncements. All of these actions and others constitute economic policy. It is not a reasonable question to ask whether the government should have an economic policy. In carrying out its generally accepted constitutional role, the government will consciously or unconciously have an impact on the economy. The question relevant to the subject matter of this course is whether the government should take into account macroeconomic conditions and its impact on them in making its decisions.

Example: *In maintaining a military establishment -- presumably for reasons not directly related to macroeconomic* *conditions -- the U. S. government makes huge expenditures. How it finances that expenditure -- whether it be through taxes or borrowing -- may have a big impact on the unemployment rate, the rate of inflation, and the rate of growth of GNP. There is no getting around the fact that this financing decision has to be made, and how it is made may be of major economic importance.*

b. It is generally agreed that the government should make economic policy in the public interest and that this requires being concerned about macroeconomic conditions. It is also generally presumed that, in the United States, the representative, democratic political system will make government adequately responsive to the wishes of the people and will bring about generally acceptable compromises between differing points of view. Whether this be true is not the subject matter of economics, although it should be recognized that there is a small but vocal group of economists who believe that the U.S. political system, does not work effectively because of the nature of its economic system, and that this should fall within the subject matter of economics. Be that as it may, this course will not focus on such issues.

Example: *Some radical economists believe that there is a relatively small segment of the economy that controls big business and that also, through its economic power, has disproportionate political influence. This is one reason why these economists argue for a peaceful socialist revolution.*

c. As the above suggests, it is a normal part of the political process for there to be debate and disagreement about what constitutes the right government economic policy. A substantial part of most discussion is concerned with differences of opinion about what the objectives or goals of any economic policy should be. But, another great source of disagreement is difference of opinion about what the effects of any particular policy action would be. It is important for anyone trying to understand public debate about economic policy to distinguish between disagreements about the objectives of policy and disagreement about the effects of policy.

Example: *The President may propose a budget which he claims should and will reduce both inflation and unemployment. The Senator criticizes the proposal because it will, he claims, reduce unemployment, but increase inflation. The Congressman supports the proposal for the same reason. In this case, both the Senator and the Congressman disagree with the President, but agree with each other, about what the effects of the proposed policy would be. However, the Senator and the Congressman disagree with each other, but not necessarily with the President, about what the goals of budget policy should be.*

1.4.2. Policy objectives

a. In thinking about economic policy it is useful to distinguish between instrument variables and target variables. Instrument variables are those which the government controls directly. Target variables are those which are of concern to the public and, therefore, to the government and the values of which depend on the values of instrument variables. Thus the government can affect the target variables through its control of the instrument variables.

Example: *To the extent that GNP can be affected by changes in some instrument variable and is of concern to the government, it is a target variable. If government expenditure has an effect on GNP, it is an instrument variable.*

b. What the target variables should be and what values for them the government should seek is primarily a subjective matter and consequently is not the province of the professional economist. There is nothing about the training of an economist that makes him better qualified than any other citizen to decide what the goals of government policy should be. This is not to say that economists cannot usefully contribute to the process by which policy objectives are formed. The economist may be helpful by spelling out for the public and the politician what the alternative target variables might be so that an informed choice can be made.

Example: *In some respects there seems to be broad agreement about the objectives of economic policy. Most people agree that lower unemployment and lower inflation are desirable. In fact these objectives have been written into law in the form of the Full Employment Act. In other areas there has been much disagreement. Whether the government should encourage a rapid growth of potential GNP is a matter of considerable controversy. Both of these issues will be discussed in detail later in the course.*

c. In formulating public policy it is not enough to have agreement, for example, that lower unemployment and lower inflation are desirable. It would also be necessary to have agreement on the relative importance of each. This is because it may not be possible to achieve both objectives simultaneously and a choice will have to be made as to which objective must be sacrificed

Example: *In some circumstances it may not be possible to reduce unemployment without increasing inflation, or vice versa. To make a decision it is necessary to have reached agreement about whether lower unemployment or lower inflation is more important.*

d. The existence of **trade-offs** amorg alternative policy objectives requires the body politic to be more precise in its formulation of goals than merely deciding that more of A, B, or C is desirable. It must also be prepared to say how desirable unit increases in A, B or C are relative to one another.

Definition: **Trade-off** -- there is a trade-off between two objects if it is impossible to obtain more of one object without giving up some of the other.

Example: *If a final amount of money is to be spent on food and clothing, then the more food is bought, the less clothing it will be possible to buy. In this case, the buyer faces a trade-off between food and clothing.*

c. In order to make rational economic policy it is necessary for decision makers to formulate, at least implicitly, a **social welfare function.** That is, they must be able, in situations where multiple objectives involving trade-offs exist, to rank alternative possible outcomes of policy actions. Any consistent set of rankings can be represented by an explicit social welfare function.

Definition: **Social welfare function** -- an expression, possibly in mathematical form, which indicates how the well-being of society is influenced by the values of one or more target variables.

Example: *Suppose unemployment (U) and inflation* $\left[\frac{\Delta P}{P}\right]$ *are the only two target variables. One possible social welfare function might be:*

$$\text{Welfare} = -3U - 2\left[\frac{\Delta P}{P}\right]$$

For this example, each percentage point of unemployment rate subtracts 3 units from social welfare while each point of inflation rate subtracts 2 units. Both detract from social welfare, but according to this social welfare function an extra percentage point of unemployment is worse than an extra percentage point of inflation.

1.4.3. The role of the economist

a. As indicated above it is not the economist's responsibility to tell society what is good for it. As individual citizens, of course, economists are free to hold their own opinion as to what society's objectives should be, but they have no special competency or training which makes their opinions superior. It is the economist's role to try to learn enough about the way the economy functions to make it possible for the government to intelligently pursue politically determined goals.

That is, economists are qualified to make **positive**, but not **normative**, statements.

Definitions: **Positive** statement -- a statement about the state of the world which can in principle be refuted or verified by empirical evidence.

Normative statement -- a statement containing a value judgment as to what constitutes right and proper action.

Example: *The statement: "If the government increases taxes, then the rate of inflation will decrease" is a positive statement. The statement: "The government should increase taxes, so as to decrease the rate of inflation" is normative.*

b. In order to understand how the economy functions and to be able to predict the effects of instrument variables on target variables, economists must construct models of the economy which show how different variables are interrelated. This would involve (1) specifying a set of assumptions and deducing their implications, and (2) testing the model against data on economic behavior in the real world.

Example: *The model of market behavior discussed in section 1.1 involves the assumptions that demand curves are negatively sloped and supply curves are positively sloped. From this it can be deduced that if there is a shift to the right in the supply curve, the price will fall. In principle, both the assumptions and the conclusions of the model can be tested with data from market behavior in the real world.*

c. It is frequently claimed that economists often disagree with one another about the way the economy works. Such disagreement does exist, although to a lesser extent than most laymen realize. Usually the disagreement stems from a difference in opinion about the validity of the assumptions incorporated in an economic model. Because sufficient data are not always available and what data that are available come from the real world rather than the controlled environment of a laboratory, it is often difficult to make definitive empirical tests of economic models. It is one of the purposes of economic research to collect enough data and carry out empirical tests so that disputes about how the economy functions can be resolved.

Example: *Sometimes in markets it is observed that when the supply curve shifts to the right, the price increases, rather than falling as the model would predict. This could be interpreted to mean that the demand curve is upward sloping or the supply curve is downward sloping, contrary to the assumption of the model, or that the demand curve also shifted. In a laboratory experiment, if such were possible, the demand curve would have been "held" constant. In the absence of laboratory controls, it is necessary to collect data on all those variables which might cause the demand curve to shift, and thereby, take into account any such shifts when testing the model.*

d. In formulating its economic policy, the government is forced to take into account the possible consequences in relation to many objectives. In addition to unemployment and inflation, other target variables include the share of gross national expenditure made by the government, the size of the government deficit, the level of exports and imports relative to GNP and to each other, and the growth of potential GNP. One role of the economist is to urge decision makers to clarify their thinking about the relative importance of each objective and to judge a policy by its overall impact in terms of the policymaker's social welfare function.

Example: *When any proposed policy action is discussed, it is likely that different politicians will emphasize different consequences of its implementation. Some may oppose it because of its effect on the budget deficit; others may support it because of its effect on unemployment, etc. Usually, such disagreement reflects* *differences in the social welfare function that participants in the debate want the government to adopt. The economist's contribution to the debate might be to make clear what effect the proposed action would have on all target variables and to urge all decision makers to take into account all of these effects in judging the merits of the case.*

MACRO UNIT 2

A SIMPLE MODEL OF INCOME AND EXPENDITURE DETERMINATION

2.1 The Structure of the Model
2.2 Solving the Model
2.3 Interpreting the Model

LECTURE OUTLINE

2. A SIMPLE MODEL OF INCOME AND EXPENDITURE DETERMINATION

2.1. The Structure of the Model

2.1.1. General nature of the model

a. Ideally, economists want a model of income and expenditure which will explain the levels of and changes in key aggregate variables. For policy purposes, it is desirable to have a model that will predict the effects of changes in instrument variables on target variables. Such a model of aggregate income and expenditure would enable policy makers to formulate rational policy designed to control the level of GNP and other variables. It would also enable economists to forecast future levels of economic activity.

Definition: **Model** -- a theory which focuses on the main variables of interest and indicates their interrelationships to explain how or why real-world phenomena occur.

Example: *In explaining the withdrawal of his proposal to Congress for a $50 per person tax rebate early in 1977, President Carter argued that GNP would reach target level in the coming year without the rebate. Implicitly, President Carter, or his advisers, were using a model of some kind to form such a conclusion.*

b. In order for a model of income and expenditure to achieve these objectives, it must take account of the different flows of expenditure and income and their interrelationships. That is, it must explain what determines the levels of all the variables which make up the circular flow (see section 1.2.4.), namely:

gross national income
gross national expenditure
consumption expenditure
investment expenditure
government expenditure
net exports
retained business earnings
net taxes
disposable personal income

c. Typically, a model will treat some variables as **endogenous** and others as **exogenous**. The purpose of a model is to explain the behavior of the endogenous variables, given the values of the exogenous variables. In some cases, the treatment of some variables as exogenous seems entirely in accord with the way the world functions in the sense that those variables have an effect on, but are unaffected by, variables of interest to the economist. In other cases, for the sake of simplification, some variables are treated as exogenous when they are really endogenous. Usually this is done for pedagogical purposes to focus on the interconnection of only a few variables to make clear the logical structure of certain aspects of a more complex and more realistic model.

Definitions: **Endogenous variables** -- those variables in a model the behavior of which the model is intended to explain and the values of which are determined within the model.

Exogenous variables -- those variables in a model which influence endogenous variables, but the values of which are determined outside the model.

Example: *In a model of the market for corn, the price and quantity of corn bought and sold are endogenous variables, and the factors influencing the positions of the supply curve (such as rainfall) and the demand curve (such as gross national income) are exogenous.*

d. A model consists of a set of **structural** relationships which describe how the variables in the model relate to each other. These relationships describe how the value of one endogenous variable depends on the values of other endogenous and/or exogenous variables. Some structural relationships are **behavioral** in that they describe the behavior of some agents in the economy with respect to the variables involved. Other structural relationships are **identities** in that they are true by definition.

Example: *If one were to model the market for gold, it might make sense to include the following structural relationships:*

(1) Demand curve of industrial users

(2) Demand curve of jewelers

(3) Demand curve of dentists

(4) Total demand equals sum of individual demands

(5) Supply curve of gold producers.

(1), (2), (3), and (5) are all behavioral relationships.

(4) is an identity.

e. In order for the model to be complete it must have as many structural relationships as it has endogenous variables. These structural relationships may be stated verbally, diagrammatically, or mathematically. However it is stated, the model must contain enough information to provide an explanation of the phenomena with which it is concerned.

Example: *In the simple supply and demand analysis of Section 1.1., a diagrammatic model was used. The endogenous variables (price and quantity) were equal in number to the structural relationships (supply curve and demand curve). Had the number of structural relationships been less than the number of endogenous variables -- e.g., if there had been only a supply curve -- the model would have been incapable of explaining how market price and quantity are determined.*

2.1.2. Simplifying assumptions

a. In analyzing the determination of national income and expenditure it is useful to begin with a highly simplified model. Even though such a model is too simple to be practically useful in the real world, it will help make clear the nature of macroeconomic models and it will also reveal some general principles which hold true in more complex and more realistic models.

Example: *Physicists analyze models of falling bodies in a vacuum even though they cannot create a perfect vacuum when they are interested in describing the behavior of falling bodies in air. They make the simplifying assumption that there is a vacuum for two reasons. First, it makes the analysis much simpler, thereby facilitating understanding of certain aspects of the problem. Second, under some circumstances the simple model gives a good approximation to reality.*

b. At this point the following three simplifying assumptions will be made:

(1) Government expenditure, net taxes and investment expenditure are exogenous variables. That is, none of these variables are influenced by any of the other variables in the model; they will be taken as given or determined by factors outside the model.

(2) Businesses pay out all of their after tax profits to their owners. That is, business retained earnings are equal to zero.

(3) There are no imports or exports. That is, all goods produced domestically are purchased domestically and all goods purchased domestically are produced domestically.

c. These simplifying assumptions partially satisfy the requirement that the components of expenditure and income encountered in the circular flow diagram be accounted for by the model. Government expenditure, net taxes, and investment expenditure are accounted for -- they are assumed to be exogenous. Retained business earnings and net exports are accounted for -- they are assumed to be equal to zero. What remains unaccounted for are consumption expenditure, disposable personal income, gross national expenditure, and gross national income. These must be accounted for by structural relationships.

2.1.3. The consumption function

a. In trying to identify the determinants of aggregate consumption expenditure, economists have hypothesized that disposable personal income is the single most important factor. Most people find this plausible from introspection regarding their own behavior: satisfaction is derived from consuming goods and services; the more goods and services consumed, the greater consumer satisfaction; the greater a household's disposable income, the more consumption expenditure it would be able and willing to make.

b. This hypothesis is also consistent with available evidence on the consumption behavior of individual households: on average, higher-income households spend more on consumption expenditure; and, as aggregate disposable income has increased so has aggregate consumption expenditure. Therefore, one structural relationship in our simple model is that consumption expenditure depends on disposable personal income. Since this relationship describes the behavior of households, it is a behavioral relationship.

c. There are other variables in addition to disposable personal income which are important in determining consumption, such as wealth and the age distribution of the population. For example, given the disposable personal income of households, the higher their wealth -- i.e., the higher their cumulated past saving in the form of bank accounts, real estate, stocks and bonds, etc. -- the higher consumption expenditure is likely to be. This dependence of consumption expenditure upon wealth could be included in the structural relationship. But for the sake of simplicity, it will be assumed that consumption expenditure depends only on disposable personal income.

d. The relationship between consumption expenditure and national income is frequently referred to as the **consumption function.** In other words, consumption expenditure is a function of disposable income. It is ordinarily hypothesized that (1) the **marginal propensity to consume** is a constant that is greater than zero and less than one, and (2) the level of consumption expenditure that would result if national income were zero is greater than zero. (This consumption might be financed, for example, by drawing down on past saving.)

Definition: **Marginal propensity to consume (MPC)** -- the change in consumption expenditure resulting from a change in disposable personal income. In symbols, using Δ to mean "change in", C to mean consumption expenditure, and Y_d to mean disposable personal income,

$$MPC = \frac{\Delta C}{\Delta Y_d} .$$

The symbol b will be used to represent the marginal propensity to consume, and a will be used to represent the amount of consumption spending when $Y_d = 0$. The consumption function can then be expressed algebraically as

$$C = a + bY_d .$$

e. The consumption function can also be readily expressed in diagrammatic terms. In Figure 2.1 disposable personal income is measured along the horizontal axis and consumption expenditure is measured along the vertical axis.

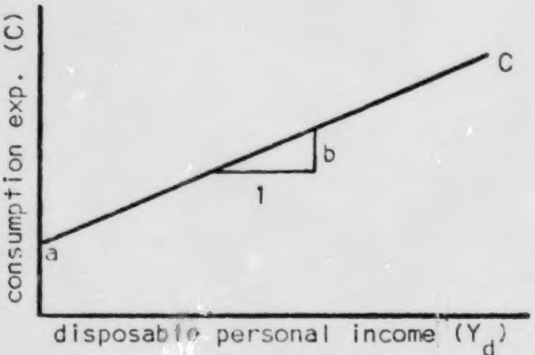


Figure 2.1

The consumption function is represented by the straight line. It shows for every value of disposable personal income the amount of consumption expenditure predicted by the consumption function. The vertical intercept (a) shows the consumption expenditure that would result if disposable personal income were zero. The slope of the line (b) is the marginal propensity to consume.

f. The hypotheses about consumption expenditure behavior incorporated in the discussion of the consumption function are broadly consistent with evidence on the national economy. The marginal propensity to consume does appear to be less than 1 and, although we have never observed the economy at a zero level of disposable personal income, observed consumption behavior is consistent with a consumption function that predicts positive consumption at very low levels of income. It should be understood, however, that economists do not expect such a simple set of hypotheses to predict actual events perfectly. At best the consumption function can only approximate the real world and any prediction based on it will be subject to a margin of error.

2.1.4. Identities

a. In this very simple model of national income and expenditure the remaining structural relationships are identities -- i.e., relationships which hold true by definition. These, together with the consumption function and the treatment of some variables as exogenous, are sufficient to yield an explanation for all of the variables involved in the circular flow of income and expenditure.

b. One of these identities is the accounting definition of disposable personal income. Since one of the simplifying assumptions is that retained business earnings equal zero, this identity is simply that disposable personal income equals gross national income minus net taxes.

c. Another accounting identity is the definition of gross national expenditure. Since net exports equal zero by assumption, gross national expenditure equals the sum of consumption, investment and government expenditure. This identity simply states that total expenditure is equal to the sum of its components.

d. The last accounting identity which completes the model is that gross national income equals gross national expenditure.

e. It is now possible to see how the model accounts for all of the variables which enter into the circular flow.

Investment expenditure -- exogenous
Government expenditure -- exogenous
Net exports -- assumed to be zero
Net taxes -- exogenous
Retained business earnings-- assumed to be zero
Consumption expenditure -- a function of disposable personal income
Disposable personal income-- gross national income minus net taxes
Gross national expenditure-- the sum of consumption, investment, and government expenditure
Gross national income -- equals gross national expenditure

2.2. Solving the Model

2.2.1. Algebraic representation

a. The clearest and simplest way to state and analyze the model is in algebraic terms. Because it is convenient to do so, symbols are used to represent variables and parameters. In the following, capital letters will be used to represent variables and lower case letters parameters. A variable which is exogenous to the model will include a bar over its symbol, e.g., $\bar{I}$, exogenous investment expenditure.

Definition: Parameter -- a factor or term in a model the value of which is constant in the sense that it does not depend on the values of the endogenous or exogenous variables in the model.

Example: *In the equation for the relationship between the circumference and diameter of a circle -- $C = \pi D$ -- C and D are variables and π is a parameter.*

b. Using C to denote consumption expenditure and Y_d to denote disposable personal income, the consumption function can be expressed in terms of the following equation:

$$(1) \quad C = a + bY_d,$$

where a and b are parameters. The parameter a is the consumption expenditure that would be made if disposable personal income were zero, and b is the marginal propensity to consume. In terms of Figure 2.2. which diagrams the consumption function, a corresponds to the vertical intercept and b corresponds to the slope of the C line.

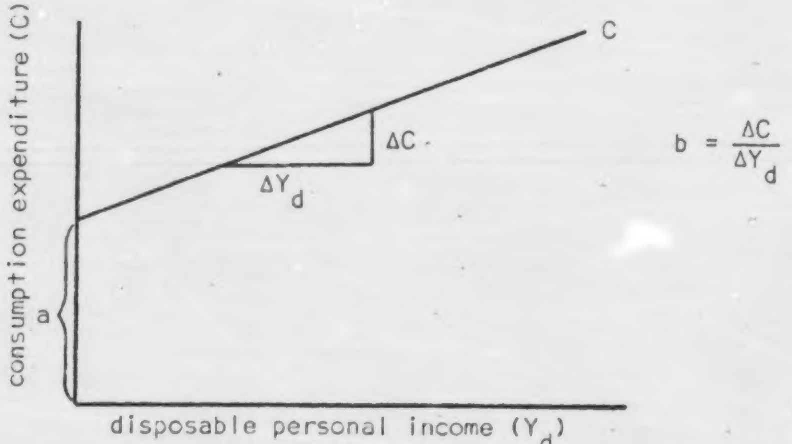


Figure 2.2

Example: *Suppose a = 100 and b = .8. Then the consumption function would be*

$$C = 100 + .8\, Y_d.$$

If Y_d were 1000, then C would be 900.

c. Using the following additional notation,

Y = gross national income,
E = gross national expenditure
I = investment expenditure
G = government expenditure
T = net taxes

the three identities in the model can be expressed simply as follows:

$$(2)\quad Y_d = Y - \overline{T}$$

$$(3)\quad E = C + \overline{T} + \overline{G}$$

$$(4)\quad Y = E$$

d. The complete model then consists of equations (1) - (4) as follows:

$(1)\ C = a + bY_d$ parameters: a, b

$(2)\ Y_d = Y - \overline{T}$ endogenous variables: C, E, Y, Y_d

$(3)\ E = C + \overline{T} + \overline{G}$ exogenous variables: $\overline{T}, \overline{T}, \overline{G}$

$(4)\ Y = E$

Since it is composed of structural relationships, it is called the structural form of the model.

2.2.2. Diagramatic representation

a. The entire model can be represented diagrammatically on a graph in which expenditure is measured along the vertical axis and income is measured along the horizontal axis. Previously, the consumption function was shown on a graph which measured C on the vertical axis and Y_d on the horizontal axis. Since the model will be used primarily to explain the determination of Y, rather than Y_d, it is useful to derive the relationship between C and Y implied by the model. By combining the consumption function and the definition for disposable income -- equations (1) and (2) -- it is possible to obtain the relationship between C and Y implied by those two relationships. Substituting the expression for Y_d from equation (2) for Y_d in equation (1), yields the following:

$$C = a - b\overline{T} + bY$$

This relationship is shown in Figure 2.3 below. It has a vertical intercept $(a - b\overline{T})$ where $a - b\overline{T}$ is constant, and a slope b.

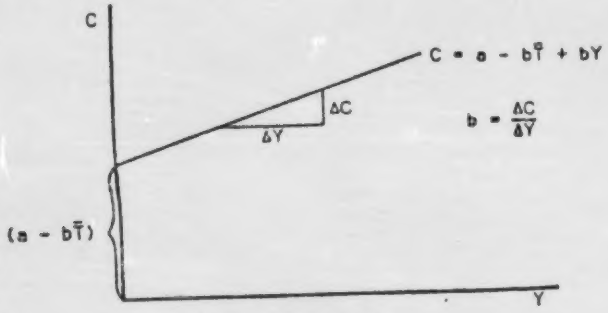


Figure 2.3

b. By adding to Figure 2.3 the information contained in equation (3), it is possible to obtain a relationship between E and Y that takes into account all of the information contained in equations (1), (2), and (3). This can be achieved by substituting the expression for C derived from equations (1) and (2) for C in equation (3) which yields:

$$E = a - b\bar{T} + \bar{I} + \bar{G} + bY \, .$$

This is shown in Figure 2.4 as line E. The first four terms in the equation -- $a - b\bar{T} + \bar{I} + \bar{G}$ -- determine the vertical intercept. The marginal propensity to consume -- the parameter b -- determines the slope. A comparison of the equation for line E with the equation for line C makes clear that line E has the same slope as line C, but an intercept that is higher by the amount $\bar{I} + \bar{G}$. That is, line E can be obtained by shifting up the C line by the amount $\bar{I} + \bar{G}$.

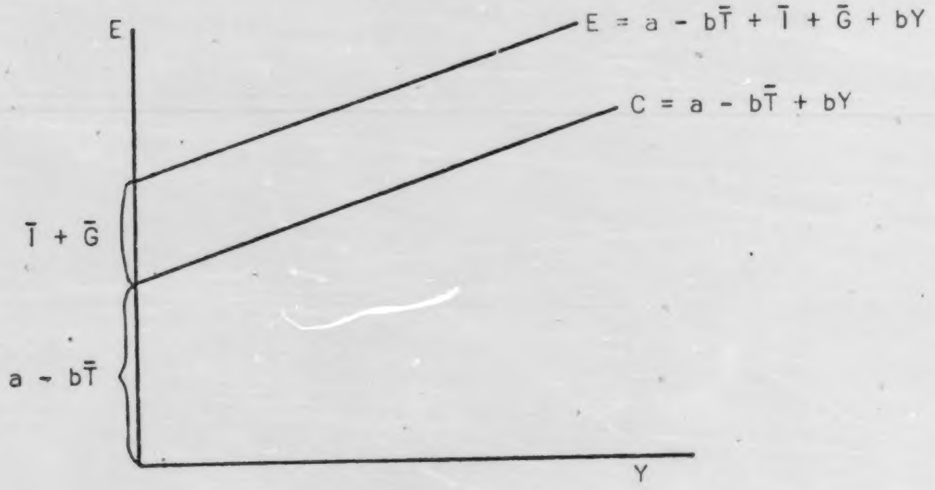


Figure 2.4

c. The line E in Figure 2.4 shows the total expenditure that households, businesses, and government would like to make for different levels of gross national income. This relationship follows from equations (1) - (3) of the model. In words, the derivation of this relationship can be stated as follows: given the assumptions that G and I are exogenous, E will change as C changes. Given that T is exogenous, Y_d will increase as Y increases. Since C depends on Y_d, C will increase as Y increases. Therefore, since E will change as C changes, E will increase as Y increases.

d. Line E shows the relationship between E and Y implied by equations (1) - (3). Equation (4) is another relationship between E and Y that can be represented on the same graph. Equation (4) says that E equals Y, which is represented by the 45° line in Figure 2.5. Together, the two lines in Figure 2.5 contain all of the information about the interrelationship between E and Y contained in the model.

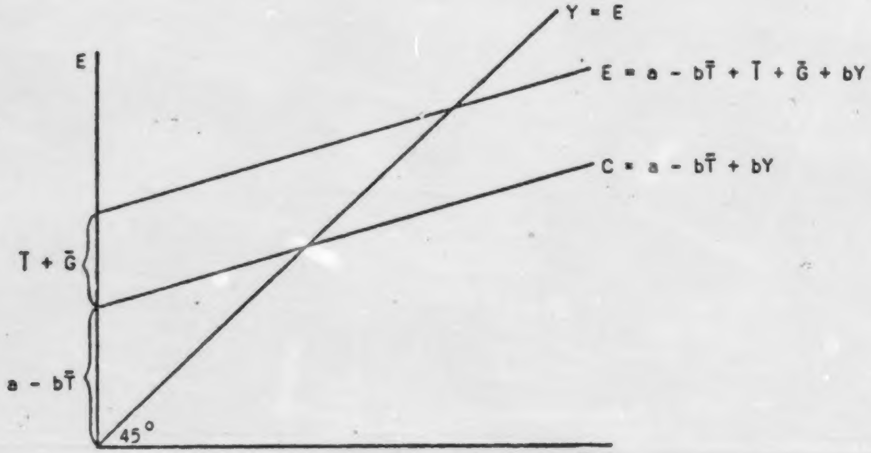


Figure 2.5

2.2.3. Solving the model diagrammatically

a. The principal objective in constructing the model is to find the values of the endogenous variables which will obtain in the economy. If the model is an approximately accurate (though a simplified) characterization of the economy, then the **solution** to the model will provide good estimates of these values. If the model is complete and logically consistent, it will contain enough information to yield a solution.

Definition: **Solution** -- the solution to a model is a set of values for the endogenous variables for which all the relationships making up the model hold true.

b. In order to obtain a diagrammatic representation of the model, the four structural relationships involving the four endogenous variables were combined to yield two relationships involving E and Y. These were shown as two lines on a graph which measured E on the vertical axis and Y on the horizontal axis. In order to find the values for E and Y for which all four structural equations hold true, it is necessary to find the combination of E and Y which lies on both lines in the graph. This is given by the intersection of the two lines.

Example: *The diagrammatic method of finding a solution to a model was used in analyzing the model of a market. The supply and demand curves were the two structural relationships involving the two endogenous variables -- price and quantity. The solution was found by locating the intersection of the two curves.*

c. The solution to the simple model of gross national income and expenditure is depicted in Figure 2.6. The solution values are denoted by an asterisk. Any combination of values for E and Y other than E* and Y* cannot be solution values, because no other combination lies on both curves simultaneously.

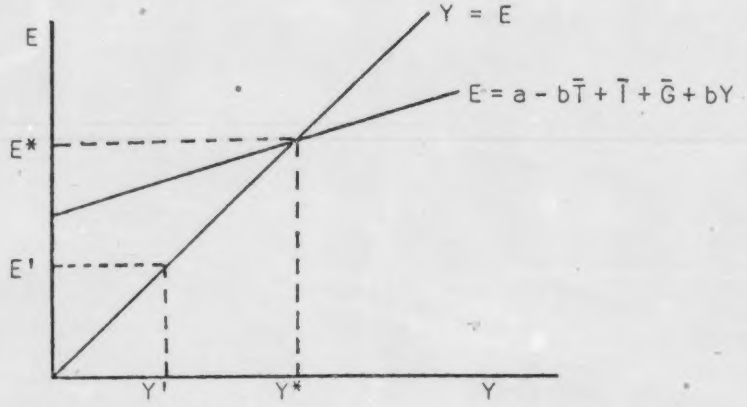


Figure 2.6

Example: *The combination E', Y' in Figure 2.6 is not a solution. While it constitutes a point on the E = Y line, it is not a point on the other line relating E and Y.*

d. By knowing how to find the solution to the model diagrammatically it is possible to see how a change in the value of any exogenous variable will affect the solution to the model. An increase in $\bar{I}$ or $\bar{G}$, or a decrease in $\bar{T}$, will have the effect of shifting up the $E = a + \bar{I} + \bar{G} - b\bar{T} + bY$ line. As can be seen in Figure 2.7, this has the effect of increasing the solution values of E and Y. The increase in E* and Y* is greater than the upward shift in the $E = a + \bar{I} + \bar{G} - b\bar{T} + bY$ line. This will be discussed more fully later.

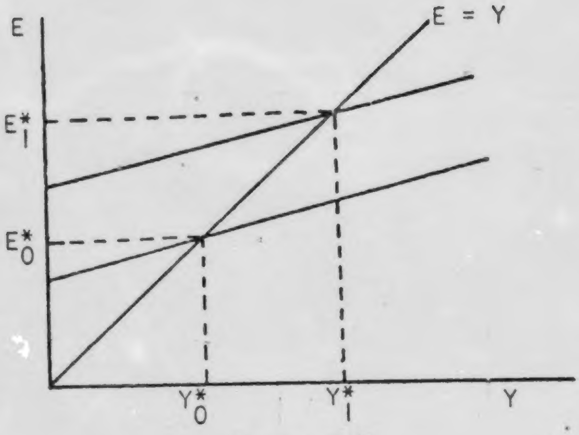


Figure 2.7

2.2.4. Solving the model algebraically

a. The solution to the model can also be found using algebraic methods. For some purposes the algebraic approach is superior since it makes it easier to obtain a precise quantitative result. The only technique in this approach which causes some students difficulty is solving a system of simultaneous equations. This can be done quite simply by substituting the expression for an endogenous variable in one equation for that endogenous variable in another equation in the models being considered here.

Example: *Consider the following system of equations involving the variables X and Y.*

(1) $Y = 12 + 5X$

(2) $X = -6 + 2Y$

By substituting the expression for X from equation (2) for X in equation (1) it is possible to find the solution value for Y, as follows:

$Y = 12 + 5(-6 + 2Y)$

$Y = 12 - 30 + 10Y$

$9Y = 18$

$Y^* = 2$

The same procedure can be used to find the solution value for X.

form of the model. The reduced form of the model gives solution values of all the endogenous variables in terms of the exogenous variables and parameters. From the reduced form it is possible to see directly how each of the exogenous variables influences the solution values of the endogenous variables.

Example: *Suppose the marginal propensity to consume (b) is 3/4. Then* $\frac{1}{1-b} = 4$ *and* $\frac{b}{1-b} = 3$. *In this case, if* $a = 100$, *then the reduced form equation for* Y^* *is*

$$Y^* = 400 - 3\overline{T} + 4\overline{I} + 4\overline{G}$$

If $\overline{T} = 200$, $\overline{I} = 150$ *and* $\overline{G} = 250$, *then*

$$Y^* = 400 - 600 + 600 + 1000 = 1400$$

2.3. Interpreting the Model

2.3.1. The concept of equilibrium

a. In the preceding section it was shown how the structural form of the model can be used -- both diagrammatically and algebraically -- to find solution values for the endogenous variables. These solution values correspond to what economists call an **equilibrium** If the economy were in equilibrium, then there would be no tendency for any of the endogenous variables to change unless there was a change in one or more exogenous variables.

Definition: **Equilibrium** -- a situation in which there is no tendency for the endogenous variables involved to change in the absence of any change in the exogenous variables.

Example: *In the market model, the solution values for p and q define an equilibrium. If* p^* *and* q^* *prevailed in the economy there would be no tendency for p and q to change unless a change in an exogenous variable caused the demand and/or supply curves to shift.*

b. When the economy is in disequilibrium there is a tendency for the endogenous variables to change. This is because one or more of the structural relationships which make up the model of the economy do not hold true, which means that some agents in the economy will adjust their behavior.

Example: *In the market model a disequilibrium exists when, for the existing price, the quantities supplied and demanded are unequal. When there is excess demand, buyers bid up the price. When there is excess supply, sellers reduce the price.*

c. The models used in this course define an equilibrium. In order for such models to be useful, it is essential that there is a tendency for the economy, when it is out of equilibrium, to converge toward the equilibrium defined by the model. If this is the case then the equilibrium is a **stable equilibrium**.

Definition: **Stable equilibrium** -- an equilibrium position toward which the economy will move from disequilibrium positions.

Example: *The market model defines a stable equilibrium if, when the price is above the equilibrium price, it tends to fall, and vice versa.*

d. In order for the equilibrium in the income-expenditure model to be stable, it is necessary that if E and Y are below their equilibrium levels, they will increase; when they are above their equilibrium levels, they will decrease. If this were not true, the model would not be very helpful in understanding the behavior of the economy since there would be no tendency for the levels of GNP in the economy to converge to the equilibrium levels of gross national income and expenditure explained by the model.

e. If the model defines a stable equilibrium, this does not mean that there will be no changes in the endogenous variables. Even for such a model there would be changes in the endogenous variables due to changes in the exogenous variables. When there are changes in the exogenous variables, the endogenous variables will converge toward their equilibrium values.

2.3.2. The economy in disequilibrium

a. In order to determine whether the equilibrium described by the income-expenditure model is stable, it is necessary to understand what is happening in the economy when it is out of equilibrium. This can be done most easily in terms of the diagrammatic representation of the model in which there are two curves as in Figure 2.8. The curve which corresponds to the equation $E = a - b\bar{T} + \bar{I} + \bar{G} = bY$ can be interpreted as showing the **desired** gross national expenditure that would result for any given level of gross national income. The $Y = E$ curve shows the **actual** level of E that would result for any given level of Y.

Definition: **Desired** gross national expenditure -- that level of expenditure which households, businesses, and government would like to make given the level of gross national income.

Actual gross national expenditure -- that level of expenditure which households, businesses, and government would be recorded as making in the national income and expenditure accounts.

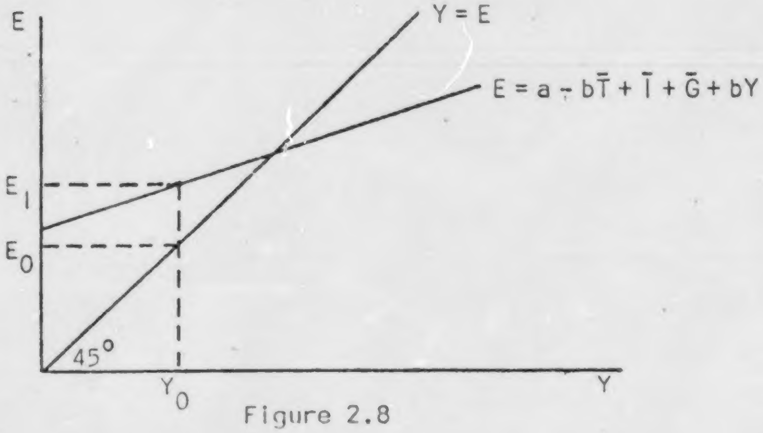


Figure 2.8

b. As Figure 2.8 indicates, actual and desired expenditure will not be equal when the economy is out of equilibrium. Since the $Y = E$ relationship holds true by definition, it must therefore be true that when the economy is out of equilibrium, the economy is not on the $E = a - b\bar{T} + \bar{I} + \bar{G} + bY$ curve. Actual expenditure will thus be different from desired expenditure when the economy is out of equilibrium. C will be less than $a - b\bar{T} + bY$, I will be less than $\bar{I}$, and/or G will be less than $\bar{G}$.

Example: *In Figure 2.8, at* Y_0, E_0 *(actual E) is less than* E_1 *(desired E).*

c. Below equilibrium, actual expenditure is less than desired. In this situation, households, businesses, and/or government must be purchasing less than they like. This could take the form of **unfilled orders**. This provides a motive for producers to hire more factors of production and produce more output, both to meet the unfilled orders and to avoid there being [illegible]w orders which go unfilled. The increase in production will result in an increase in income and actual expenditure which is a move toward equilibrium.

Definition: **Unfilled orders** -- desired consumption, investment or government expenditures which are not made because the commodities are unavailable.

Example: *Suppose the economy were initially at an equilibrium, but an increase in* $\bar{I}$ *caused* Y^* *to increase. Businesses might try to make purchases for new capital goods at the new higher level, but if producers did not respond immediately by expanding output, their orders for these goods would not be filled completely. The existence of these unfilled orders, however, would provide an incentive to producers to expand production.*

d. When Y is less than Y^* the disequilibrium can also show up in the form of **undesired inventory disinvestment**. Producers normally hold inventories of the goods they produce to meet unexpected increases in demand for their product. When demand is higher than expected then the stock of inventories is reduced. Just as the increase in the stock of inventories is a form of business investment expenditure, so is a decrease in inventories a form of disinvestment. Since a decrease in inventories due to an unexpected increase in demand is unplanned or unintended, it is termed undesired inventory disinvestment. The reduction of inventories below normal levels provides producers with an incentive to increase output to replenish their stocks of inventories and to prevent further declines.

Definition: **Undesired inventory disinvestment** -- the completion of sales by a reduction of producers' stocks of inventories of final goods below normal levels.

Example: *In a situation where Y is less than Y* it might occur that household demand for automobiles exceeds the current level of production. If there were no inventories this would lead to unfilled orders, as sometimes occurs. If producers have stocks of automobiles in inventory, they may satisfy that excess demand by reducing their stock of inventories. This would be undesired inventory disinvestment.*

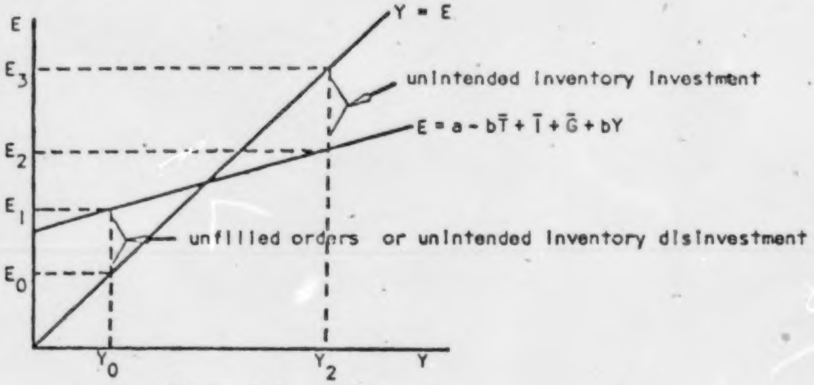

Y = E
E
E_3
unintended inventory investment
$E = a - b\bar{T} + \bar{I} + \bar{G} + bY$
E_2
E_1
unfilled orders or unintended inventory disinvestment
E_0
Y_0
Y_2
Y

Figure 2.9

e. Above equilibrium, actual expenditure exceeds desired expenditure. In this situation production exceeds the amount that households, businesses, and government want to buy. The difference takes the form of undesired or unintended inventory investment, i.e., actual I is greater than the desired amount of $\bar{I}$. (See Figure 2.9.) That is, producers find they cannot sell all they produce and their stocks of inventories of final goods increase above normal levels. In this situation there is a motive to reduce production, which would result in a movement in E and Y toward equilibrium.

f. Since there is a tendency to move toward equilibrium whenever the economy is out of equilibrium, it can be expected that the equilibrium described by the income-expenditure model is stable.

2.3.3. Changes in equilibrium.

a. It will be presumed throughout that the economy moves fairly rapidly to its equilibrium position. Observed changes in the economy can then be interpreted as changes resulting from changes in the equilibrium position, rather than changes from disequilibrium to a fixed equilibrium position. Changes in the equilibrium can occur only if there are changes in the exogenous variables or in the parameters of the model. This can be seen most clearly in terms of the reduced form of the algebraic representation of the model.

b. Consider the reduced form equation for Y:

$$(5)\quad Y^* = \frac{1}{1-b}(a - b\bar{T} + \bar{I} + \bar{G})$$

In this equation Y* depends only on exogenous variables and parameters. If none of these change, then Y* will not change. By rewriting (5) as

$$Y^* = \frac{a}{1-b} - \frac{b}{1-b}\bar{T} + \frac{1}{1-b}\bar{I} + \frac{1}{1-b}\bar{G},$$

it is possible to see how a change in any one of the exogenous variables, given the values of a and b, will affect Y*. Let the subscripts 0 and 1 be used to denote the levels of the variables before and after a change. Then Y^*_1 and Y^*_0 will be determined as follows:

$$Y^*_1 = \frac{a}{1-b} - \frac{b}{1-b}\bar{T}_1 + \frac{1}{1-b}\bar{I}_1 + \frac{1}{1-b}\bar{G}_1$$

$$Y^*_0 = \frac{a}{1-b} - \frac{b}{1-b}\bar{T}_0 + \frac{1}{1-b}\bar{I}_0 + \frac{1}{1-b}\bar{I}_0$$

Subtracting the second equation from the first gives:

$$Y^*_1 - Y^*_0 = -\frac{b}{1-b}(\bar{T}_1 - \bar{T}_0) + \frac{1}{1-b}(\bar{I}_1 - \bar{I}_0) + \frac{1}{1-b}(\bar{G}_1 - \bar{G}_0).$$

That is, the change in Y* depends only on the parameters and the changes in exogenous variables. Using Δ to indicate "change in", it is possible to write the relationship as

$$\Delta Y^* = -\frac{b}{1-b}\Delta\bar{T} + \frac{1}{1-b}\Delta\bar{I} + \frac{1}{1-b}\Delta\bar{G}$$

which shows precisely the effect on Y* that a change in any of the exogenous variables will have. If either $\bar{I}$ or $\bar{G}$ increases, **ceteris paribus**, Y* will increase by $\frac{1}{1-b}$ times the change in $\bar{G}$ or $\bar{I}$. If $\bar{T}$ increases, **ceteris paribus**, Y* will decrease by $\frac{b}{1-b}$ times the change in $\bar{T}$.

Definition: **Ceteris paribus** -- other relevant factors (in this case, parameters and other exogenous variables) remaining constant.

Example: *If* $B = .75$, *then* $\frac{b}{1-b} = 3$ *and* $\frac{1}{1-b} = 4$. *Consequently*

$$\Delta Y^* = -\,3\,\Delta\bar{T} + 4\Delta\bar{I} + 4\Delta\bar{G}.$$

If $\bar{G}$ *were to increase by 10,* **ceteris paribus,** *then* Y^* *would increase by* 4×10*, or 40. If* $\bar{G}$ *were to increase by 10 and* $\bar{I}$ *were to decrease by 10,* **ceteris paribus,** *then* Y^* *would remain unchanged.*

c. The coefficients of the exogenous variables in the reduced form equations depend on the parameters of the model. They will not generally be equal to one, which means, for example, that an increase in $\bar{I}$, ceteris paribus, will result in an increase in Y^* of a different amount. If one were to look only at part of the structural model, a different conclusion might be reached. Equations (3) and (4),

$$(3)\quad E = C + \bar{I} + \bar{G}$$

$$(4)\quad Y = E,$$

taken by themselves might lead one to think that an increase in $\bar{I}$ would lead to an equal increase in Y^*. The reduced form equation, however, takes into account additional information contained in equations (1) and (2) and shows the full effect of a change in any of the exogenous variables.

d. Equations (3) and (4) by themselves give an incomplete account of the effects of a change in $\bar{I}$ (or $\bar{G}$ or $\bar{T}$). They ignore the effect that an increase in $\bar{I}$ will have on C, which is why equations (1) and (2) need to be included in the analysis:

$$(1)\quad C = a + bY_d$$

$$(2)\quad Y_d = Y - T.$$

An increase in $\bar{I}$ will increase E and Y as equations (3) and (4) make clear. But the increase in Y will increase Y_d and, therefore, C as equations (1) and (2) show. This in turn will cause a further increase in E and Y. The lesson is that to identify the effect of a change in an exogenous variable, it is necessary to take into account all of the simultaneous interrelationships among the endogenous variables in the model. The reduced form equations do just that.

2.3.4. Multipliers

a. In the preceding sections it was shown that a change in an exogenous variable, ceteris paribus, will result in a change in the equilibrium value of the endogenous variable. This change will be equal to the change in the exogenous variable times a **multiplier**. The coefficients of exogenous variables in reduced form equations are multipliers.

Definition: **Multiplier** -- the increase in the equilibrium value of an endogenous variable that will result from a unit change in an exogenous variable.

Example: *In the reduced form equation for Y,*

$$Y^* = \frac{a}{1-b} - \frac{b}{1-b}\overline{T} + \frac{1}{1-b}\overline{I} + \frac{1}{1-b}\overline{G},$$

the coefficient of $\overline{I}$, $\frac{1}{1-b}$, *is the investment multiplier for gross national income. This means, ceteris paribus, that*

$$\Delta Y^* = \frac{1}{1-b}\Delta\overline{I}.$$

b. The values of the investment and government expenditure multipliers for gross national income depend on the value of b, the marginal propensity to consume. The higher b is, the higher the value of the multipliers are. This makes sense because the multiplier takes into account the effect on C that results from changes in Y brought about by changes in the exogenous variables. The higher b is, the larger the effect on C. Put another way, the change in Y^* consists of two components:

(1) the **autonomous change** in $\overline{I}$ or $\overline{G}$;
(2) the **induced change** in C.

Definitions: **Autonomous change** -- a change due to some cause outside of the model.

Induced change -- a change caused by some determining factor within the model.

Example: *The government's increase in G to fight the Vietnam War was an autonomous change. The resulting increases in Y and C which resulted from the increase in G was an induced change.*

c. The induced change in C which results from an autonomous change in $\bar{I}$ or $\bar{G}$ is higher when b is higher. Consequently, the size of the investment or government expenditure multiplier is higher when b is higher.

Example: *The value of the investment and government expenditure multiplier for Y is* $\frac{1}{1-b}$. *If* $b = .6$, $\frac{1}{1-b} = 2.5$. *If* $b = .8$, $\frac{1}{1-b} = 5$.

d. The net tax multiplier equals $-\frac{b}{1-b}$. It is negative because the effect of increasing net taxes is to reduce disposable personal income and, therefore, consumption expenditure. The change in Y^* due to a change in $\bar{T}$ also consists of two components:

(1) The initial induced change in C caused by the autonomous change in $\bar{T}$;
(2) the induced change in C caused by the induced change in Y.

Like the $\bar{I}$ and $\bar{G}$ multipliers, the $\bar{T}$ multiplier is larger in absolute value when b is larger, since both components depend on b.

Example: *The net tax multiplier for Y is* $-\frac{b}{1-b}$. *If* $b = .6$, $-\frac{b}{1-b} = -1.5$. *If* $b = .8$, $-\frac{b}{1-b} = -4$.

The $\bar{I}$, $\bar{G}$, and $\bar{T}$ multipliers can be seen in terms of Figure 2.10. The effect of a change in $\bar{I}$, $\bar{G}$, or $\bar{T}$ is to shift the $E = a - b\bar{T} + \bar{I} + \bar{G} + bY$ line. An increase in $\bar{I}$ or $\bar{G}$ would shift the line up by that amount. A decrease in $\bar{T}$ would shift the line up by b times that amount. As a result of such a shift, the initial equilibrium (E_0^*, Y_0^*) would no longer be an equilibrium because desired expenditure would exceed actual by the amount of shift in the desired expenditure line. If E and Y were to increase by that amount from their initial equilibrium values (E_0^*, Y_0^*) to (E_1, Y_1), the new position would not be an equilibrium because actual expenditure E_1 would be less than desired expenditure by the amount of the increase in C induced by the increase in Y from Y_0^* to Y_1. If E and Y were to increase to (E_2, Y_2) to take into account that induced increase in C, the new position would still not be an equilibrium because the desired expenditure would exceed actual expenditure by the amount of the increase in C induced by the increase in Y from Y_1 to Y_2. Only if Y increases to Y_1^* will the economy reach an equilibrium. The increase in E and Y from (E_0^*, Y_0^*) to (E_1^*, Y_1^*) will equal the sum of the autonomous and induced changes in expenditure.

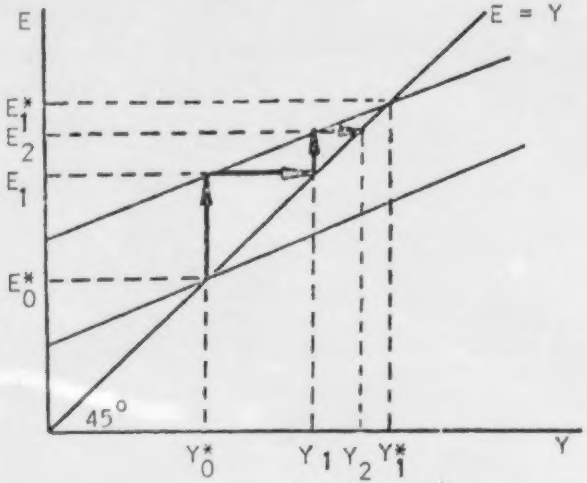


Figure 2.10

Example: *Suppose b = .5 and there is an increase in $\bar{I}$ of 10. It would be possible to calculate the change in equilibrium E and Y by adding up the changes in E and Y due to the change in expenditure and the sequence of induced changes in consumption as follows:*

Changes in Components of Spending	*Resulting Change In Y*
1. Autonomous change in $\bar{I}$ of 10.00	*Y increases by 10.00*
2. Consumption increases by 5.00 because of the preceding 10.00 increase in Y	*Y increases by 5.00*
3. Consumption increases by 2.50 because of the preceding 5.00 increase in Y	*Y increases by 2.50*
4. Consumption increases by 1.25 because of the preceding 2.50 increase in Y	*Y increases by 1.25*
.	.
.	.
total change	*20.00*

f. As indicated in Section 2.3.3., it will be presumed in this course, unless otherwise stated, that the economy is in equilibrium all the time. That is, it is assumed that the economy adjusts instantaneously in response to changes in exogenous variables. Put in different words, it is assumed that the multiplier process is worked through very quickly. In terms of Figure 2.11, if there is an autonomous change in expenditure from time period 0 to time period 1 which causes the E curve to shift from E_0 to E_1, it is assumed here that actual Y will increase from Y_0^* in period 0 to Y_1^* in period 1.

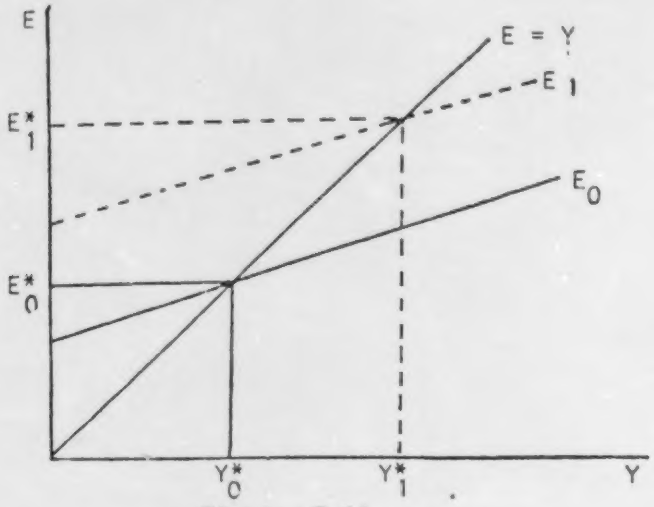

E
E = Y
E 1
E_1^*
E_0
E_0^*
Y_0^*
Y_1^*
Y

Figure 2.11

g. In the real world, however, the multiplier process is not completed instantaneously. That is, when there is an autonomous change in some component of expenditure, the economy does not jump immediately, but converges over time, to the new equilibrium. During this period of convergence, of course, the economy will be in a state of disequilibrium. This can be seen in terms of Figure 2.12a and 2.12b in which a possible response of the economy to an autonomous increase in $\bar{I}$ is depicted.

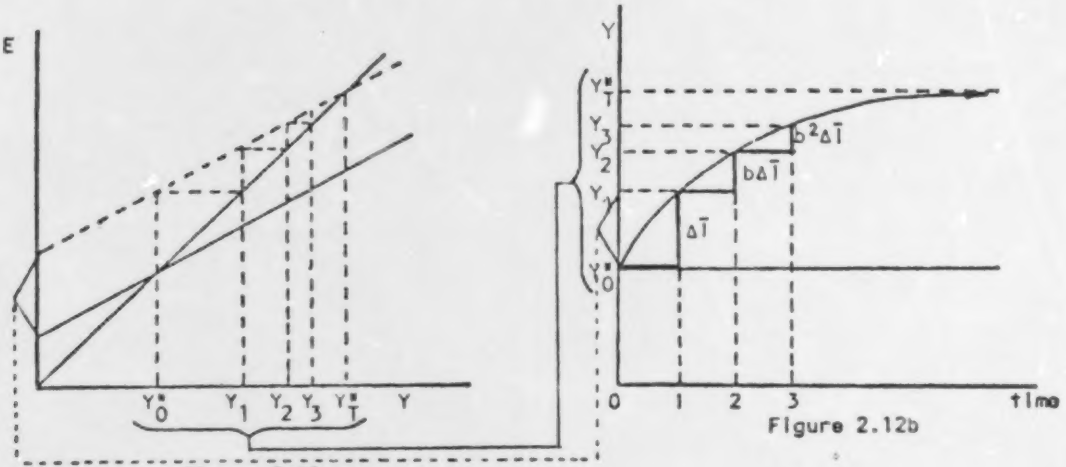

E
Y_0^*
Y_1
Y_2
Y_3
Y_T^*
Y
Y
Y_T^*
Y_3
Y_2
Y_1
Y_0^*
$b^2\Delta\bar{I}$
$b\Delta\bar{I}$
$\Delta\bar{I}$
0
1
2
3
time

Figure 2.12a

Figure 2.12b

The economy is assumed to be initially in equilibrium in period 0 at Y_0^*. One period later (this could be a week, a month, or longer, depending on how quickly the economy adjusts) it is assumed that $\bar{I}$ increases by $\Delta\bar{I}$. In period 1, actually Y increases by the amount of the autonomous increase in $\bar{I}$ to a level Y_1, but is not in equilibrium. In period 2, Y increases further by the amount $b\Delta\bar{I}$ to a level Y_2, but is still not in equilibrium. This second period increase results from the induced increase in C resulting from the increase in Y in period 1. In period 3, Y increase by $b^2\Delta\bar{I}$, which is the induced increase in C due to the previous period's increase in Y. Eventually, Y will converge to Y_T^* which is the new equilibrium.

h. The time path of the economy described above is only one possible response to an autonomous change in expenditure, but it is a reasonable one. If the time periods are fairly short in which each successive round of adjustment occurs, then the assumption made here that the economy is always in equilibrium is quite a reasonable approximation to reality. However, the possibility of a longer lag in the response of the economy should be kept in mind when applying the income-expenditure model to the real world.

MACRO UNIT 3

AGGREGATE DEMAND, UNEMPLOYMENT, AND INFLATION

3.1 Aggregate Demand Relative to Potential GNP
3.2 Unemployment and Inflation

3. AGGREGATE DEMAND, UNEMPLOYMENT, AND INFLATION

3.1. Aggregate Demand Relative to Potential GNP

3.1.1. Aggregate demand

a. The equilibrium level of gross national expenditure is frequently called aggregate demand. That is, aggregate demand is the level of GNP for which desired and actual gross national expenditure are equal. In terms of the simple income-expenditure model, aggregate demand is equal to the solution values E^* and Y^*. In the following, aggregate demand will be represented by the symbol Y^*.

b. In the income-expenditure model, which seeks to explain how the level of aggregate demand is determined, there is nothing tending to make aggregate demand equal to potential GNP. As explained by that simple model, aggregate demand can be greater or less than potential GNP. Figures 3.1a and 3.1b depict these two situations. Aggregate demand (Y^*) is greater in one case, and smaller in the other, than potential GNP (Y_p).

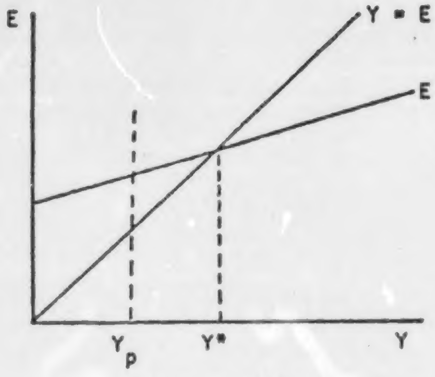


Figure 3.1a

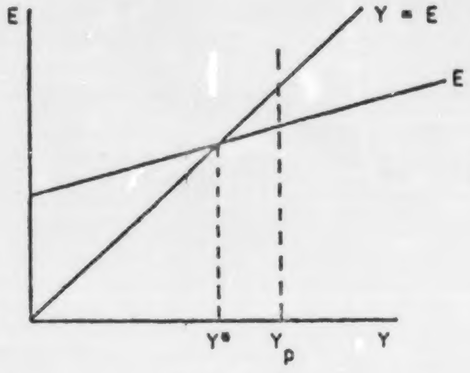
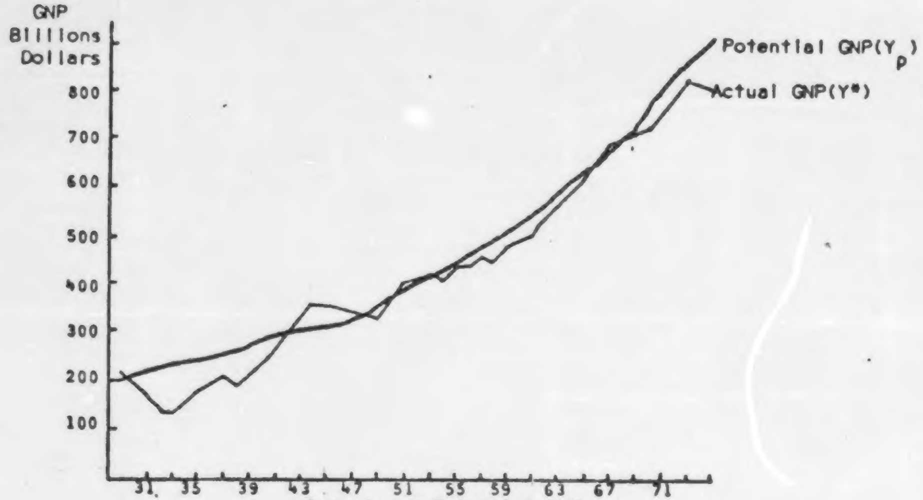


Figure 3.1b

c. In more complex macroeconomic models, aggregate demand is not completely independent of potential GNP as it is in the simple model. Such models will be discussed more fully later in the course. It should be understood, however, that the simple model captures an essential characteristic of the real world -- namely, aggregate demand does not automatically equal potential GNP in the short run.

Example: *As can be seen in Figure 3.2., Y^* has frequently been less, and occasionally greater, than Y_p. This is* *consistent with the absence in the income-expenditure model of any tendency for aggregate demand to equal potential GNP.*



Actual and Potential GNP
Figure 3.2

In 1933, for example, the economy was in the depths of the great depression. Aggregate demand in 1958 prices was about 80 billion dollars, or more than 35 percent below potential GNP. In 1944 the economy was engaged in World War II. Aggregate demand was then about 50 billion dollars, or nearly 17 percent greater than potential GNP. The situation in 1944 corresponds to Figure 3.1a, and the situation in 1933 to Figure 3.1b.

3.1.2. Aggregate demand and unemployment

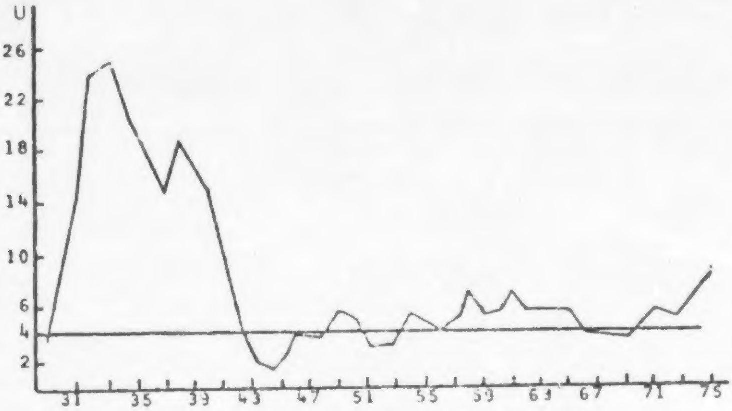
a. When aggregate demand (Y^*) equals potential GNP (Y_p), then actual output will tend toward an equilibrium where producers are producing all of the output they are normally capable of producing. In such a situation the economy is considered to be at full employment. It should be remembered (see section 1.3.4) that the full employment unemployment rate (U_f) will be greater than zero because of frictional and structural unemployment.

b. If Y^* is less than Y_p, then actual GNP will tend toward a level at which producers cannot sell all that they are capable of producing with the available supply of resources. That is, the economy will converge to an equilibrium where the output that households, businesses, and government are willing to buy can be produced with fewer resources than are available. As a consequence, the unemployment rate will exceed U_f.

Example: *In 1975, actual GNP in 1958 prices was $123 billion, or about 13 percent below potential GNP. The unemployment rate was 8.5 percent which is well above* U_f, *usually considered to be 4 percent.*

c. If Y^* exceeds Y_p, then actual GNP will tend toward a level which exceeds the amount that producers are capable of producing with the supply of resources normally available. This is possible by reducing the amount of frictional unemployment so that the unemployment rate falls below U_f. In this situation there will be fewer unemployed persons than there are unfilled jobs.

Example: *As can be seen in Figure 3.3, the unemployment rate has been below 4 percent since 1929 on only three occasions: 1942-45, 1951-53, and 1966-69. All three periods were during wartime when aggregate demand was very high relative to potential GNP. (Later in the course, the question of why there have not been more frequent periods when* Y^* *exceeded* Y_p *will be considered.)*



Unemployment Rate (1929-1975)
Figure 3.3

d. How high the unemployment rate (U) is in any period will depend on the relationship between Y^* and Y_p. The number of persons employed in any period will vary with the amount of output produced. The higher GNP is in any given period, the greater employment will be in that period. The lower Y* is relative to Y_p, the lower employment is relative to the labor force. That is, the larger the GNP gap in any period, the higher will be the level of U.

Definition: GNP gap -- the difference between actual and potential GNP.

Example: *If in any year Y* is less than Y_p, then the GNP gap will be positive. This can be seen in Figure 3.4 which corresponds to 1975.*

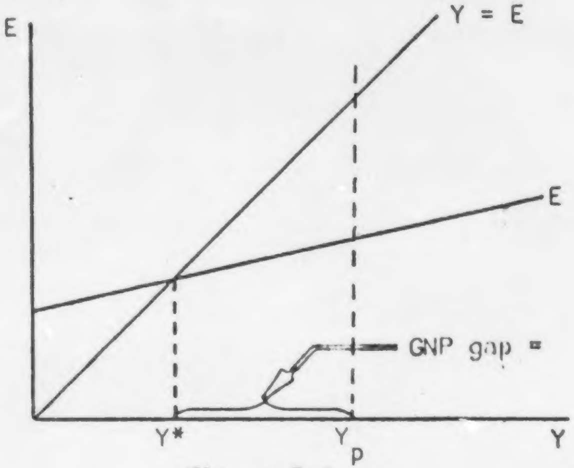


Figure 3.4

Because Y (810) was less than Y_p (933), producers did not employ all of the available labor force. Consequently, U was much higher than U_f, i.e., 8.5% as compared to 4%.*

e. Studies have shown that the relationship between U and the % GNP gap for the ranges of these variables observed since 1947 can be approximated by the following equation known as Okun's Law, named after the economist who first identified it:

$$U = U_f + c \times \% \text{ GNP gap}$$

where c is a parameter. This relationship can also be expressed as follows:

$$\% \text{ GNP gap} = \frac{1}{c}(U - U_f)$$

Definition: **% GNP gap** -- the percentage difference between actual and potential GNP.

$$\% \text{ GNP gap} = \frac{\text{potential GNP} - \text{actual GNP}}{\text{potential GNP}} \times 100$$

Example: *In his study, Okun estimated the parameter c to be equal to 1/3. That is,*

$$U = U_f + \frac{1}{3} x \% \text{ GNP gap;}$$

or to rearrange the relationship in terms of % GNP gap,

$$\% \text{ GNP gap} = 3(U - U_f).$$

According to Okun, given, for example, a full employment unemployment rate of 5 percent and a GNP gap of 3 percent, then the actual unemployment rate will be 6 percent. Looked at the other way, if the GNP gap is 12 percent, then the unemployment rate will be 9 percent, i.e., 4 percentage points higher than the full employment unemployment rate.

f. Okun's Law is shown graphically in Figure 3.5. The % GNP gap is measured on the horizontal axis and U on the vertical axis. For a % GNP gap of zero, U equals U_f. For a positive % GNP gap, $U > U_f$, and for a negative % GNP gap, $U < U_f$. The slope of the line is equal to the parameter c and indicates by how much U increases as the % GNP gap increases.

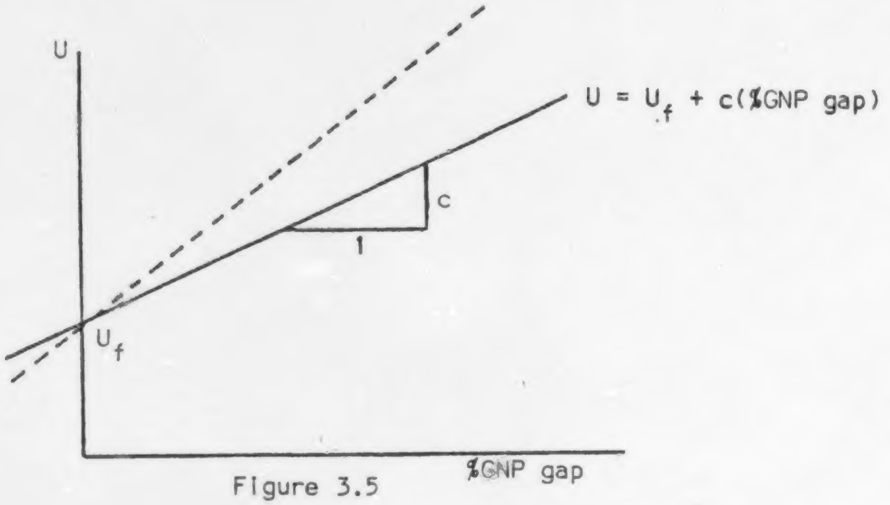


Figure 3.5

Example: *If $c = 1/3$ as Okun has estimated, then in order to have U lower by 1 percentage point in any year, it would be necessary to have Y^* about 3 percent higher. Recently some economists have argued that c is now larger than it used to be because a larger proportion of unemployed workers are less productive teenagers and middle-aged women than used to be the case. If this is true, then the relationship between U and the % GNP gap is like the dashed line in Figure 3.5. This would mean that a smaller increase in Y^* would be necessary to reduce unemployment than is implied by Okun's study.*

3.1.3. Aggregate demand and inflation

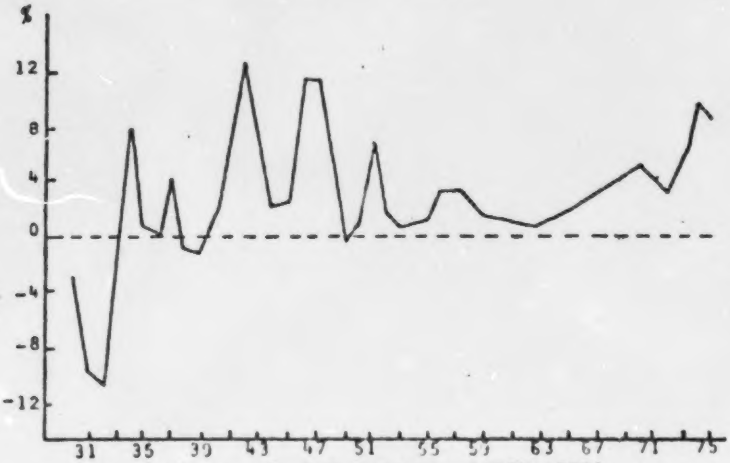
a. If aggregate demand is equal to potential GNP, the theory of supply and demand might suggest that there would be no tendency for prices to rise or fall. When the amount of output that households, businesses, and government want to buy just matches potential GNP, it could be expected that there would be neither excess demand nor excess supply in markets and, as a consequence, that there would be price stability.

b. For reasons that will be explained in Section 3.2., however, there appears to be an inflationary bias in the economy. That is, when aggregate demand equals potential GNP, instead of the average price level remaining constant, as a simple application of the theory of supply and demand might suggest, the rate of inflation is positive.

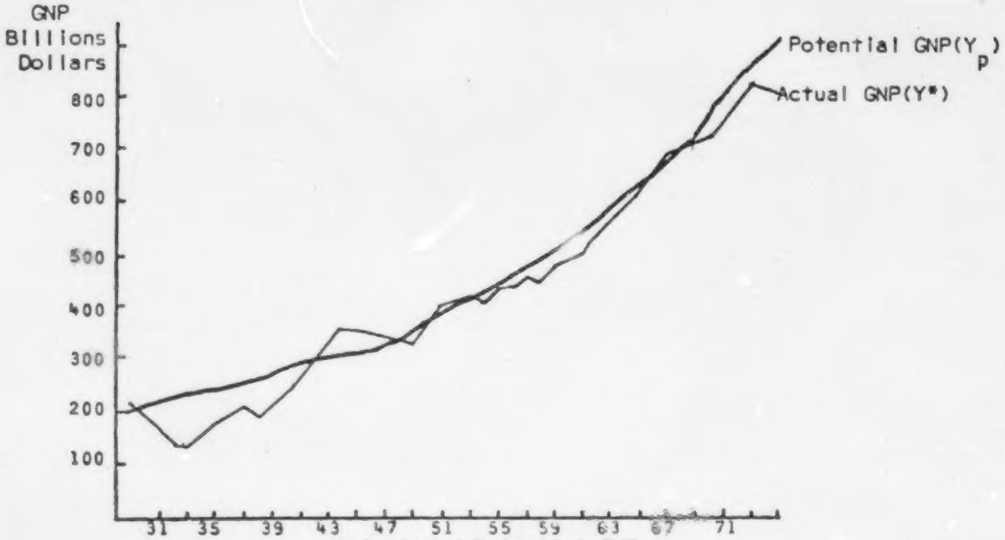
Example: *For the period since 1954, in years when the unemployment rate was between 4 and 5 percent, i.e., in years when Y^* was near to but probably not greater than Y_p, the average rate of inflation was around 3.6 percent.*

c. When aggregate demand is less than potential GNP, the theory of supply and demand would suggest that there would be deflation. For a variety of reasons, however, the average price level tends to be rigid in a downward direction. These reasons include government control of prices in some markets (for example, many agricultural products and regulated industries such as transportation and energy), and the existence of long-term fixed price contracts (for example, negotiated labor contracts between employers and labor unions). As a result, except for periods when the GNP gap is very large, the average price level does not ordinarily decrease when aggregate demand is below potential GNP. The inflation rate does, however, tend to be lower when there is a GNP gap than when the economy is at full employment.

Example: *As shown in Figures 3.6a and 3.6b, the average price level rarely decreases even when aggregate demand falls below potential GNP. For the period since 1929, there was deflation only during the 1930's when the unemployment rate was extremely high.*



Change in GNP Deflator (1930-1975)
Figure 3.6a



Actual and Potential GNP
Figure 3.6b

d. When aggregate demand exceeds potential GNP, the theory of supply and demand suggests that inflation will result. This implication appears to be supported by the evidence. Whenever excess demand pervades the economy, the result is a rate of inflation that is greater than the rate observed on average when aggregate demand and potential GNP are approximately equal.

Example: *In Figures 3.6a and 3.6b, whenever actual GNP was driven above potential GNP -- in the early 1940's, the early 1950's and the late 1960's -- the rate of inflation was substantially above average for the period since 1929.*

A closer look at the 1960's, as in Table 3.1 below, provides additional evidence of the tendency for prices to rise faster when Y^* *is greater than* Y_p *than when* Y^* *is less than* Y_p.

Table 3.1

		average U	*average* $\frac{\Delta P}{P}$
1960-65	$Y^* < Y_p$	*5.5*	*1.5%*
1966-69	$Y^* > Y_p$	*3.7*	*3.7%*

3.1.4. Inflationary bias in the economy

a. The economy is composed of many individual markets. Even at full employment some of those markets will be characterized by excess demand and others by excess supply at initial prices. This is why the full employment unemployment rate is greater than zero. All markets are not always in equilibrium and there are always some resources in the process of shifting from markets with excess supply to markets with excess demand.

Example: *Between 1973 and 1974 the demand for automobiles fell sharply while the industry's capacity to produce increased. At the same time, the demand for agricultural output rose sharply while its capacity to produce was reduced slightly due to poor weather. Consequently, if prices remained the same between 1973 and 1974, there would be excess supply of autos and excess demand for agricultural output. This can be seen in Figures 3.7a and 3.7b.*

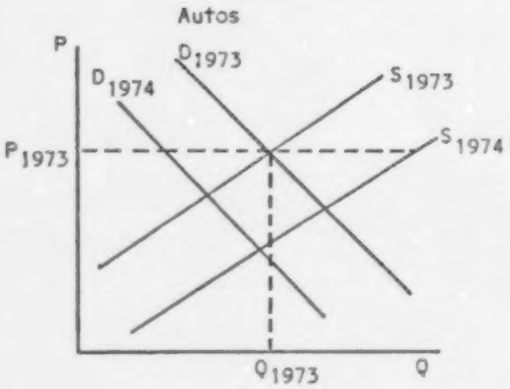


Figure 3.7a

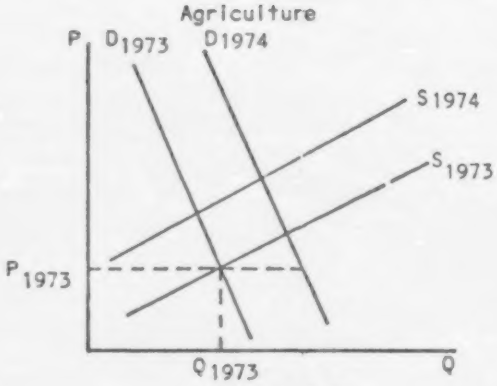


Figure 3.7b

b. If prices were perfectly flexible, it could be expected that prices would go up in markets with excess demand and down in markets with excess supply to restore equilibrium. Then price increases in some markets would be offset by decreases in others and, at full employment, there would be no reason to expect either inflation or deflation.

Example: *If the prices of autos and agricultural products were perfectly flexible, the price of autos would have fallen from 1973 to 1974, and the price of agricultural products would have risen, as in Figures 3.8a and 3.8b*

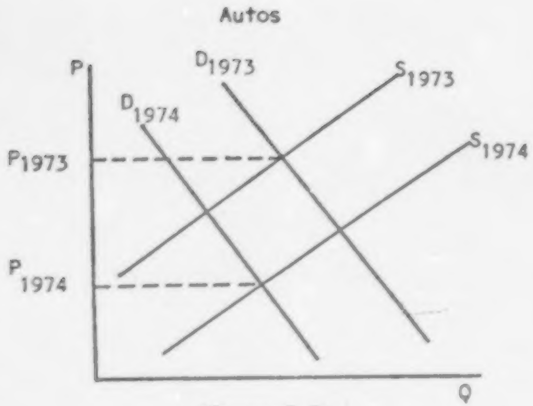


Figure 3.8a

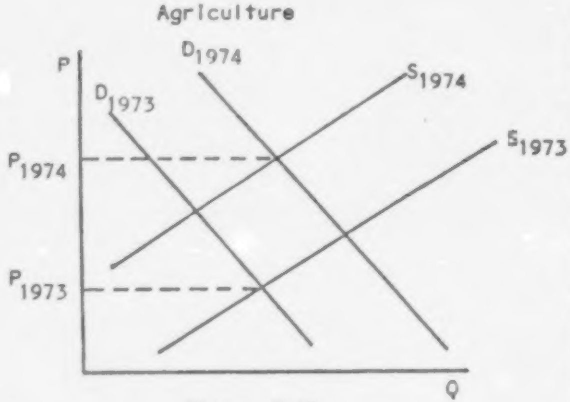


Figure 3.8b

c. The existence of downward price rigidity, however, prevents prices from falling rapidly in markets with excess supply as they increase in markets with excess demand. As a consequence, at full employment, the price increases in markets with excess demand are not offset by price decreases in markets with excess supply, and the inflation rate is positive.

Example: *In fact between 1973 and 1974 the prices of agricultural products rose by 18 percent per year while the prices of autos rose by 4 percent per year. That is, the price of agricultural output responded to the upward pressure of supply and demand, while the price of autos did not respond in like manner to the downward pressure of supply and demand. In one sector prices rose to eliminate the excess demand. In the other sector prices did not fall to eliminate excess supply. As a result, the average price level for these two sectors rose much more than would have been the case had there not been downward price rigidity in the automobile industry.*

d. As aggregate demand decreases relative to potential GNP, the number of markets with excess demand decreases and the number of markets with excess supply increases. Thus, as unemployment increases the inflation rate decreases until a level of unemployment is reached where the price increases in the relatively few markets with excess demand are fully offset by the price decreases in the relatively many markets with excess supply.

e. In summary, the fact that the economy is composed of many individual markets, a good number of which are characterized by downward price rigidity, causes there to be an inflationary bias.

3.2. Unemployment and Inflation

3.2.1. The Phillips curve

a. In section 3.1 it was stated that when aggregate demand equals potential GNP, the rate of unemployment will equal U_f and the rate of inflation $\left(\frac{\Delta P}{P}\right)$ will be positive. For higher levels of aggregate demand, given potential GNP, the unemployment rate will be lower and the inflation rate will be higher than when Y^* equals Y_p. For lower levels of aggregate demand, the unemployment rate will be higher and the inflation rate lower than would prevail if Y^* were equal to Y_p.

Example: *In Figure 3.9 inflation and unemployment data for the 1960's is plotted. Those data clearly show that low U's tend to be associated with high rates of inflation* $\left(\frac{\Delta P}{P}\text{'s}\right)$*, and vice versa. The line drawn through these points can be thought of as an approximation to the relationship between unemployment and inflation that existed in the 1960's.*

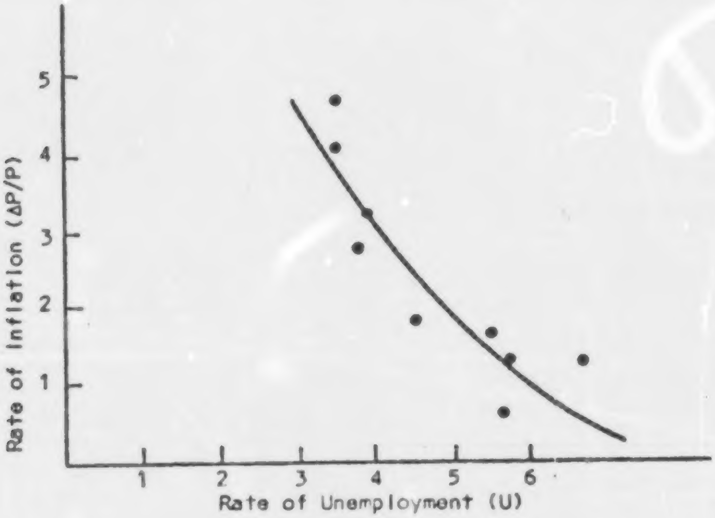


Figure 3.9

b. The analysis of Section 3.1 and the data for the 1960's given in Figure 3.9 suggest that there is an inverse relationship between unemployment and inflation as depicted in Figure 3.10. That is, for lower unemployment rates there will be higher inflation rates, and vice versa. This relationship is called the Phillips Curve, named after the economist who first observed it.

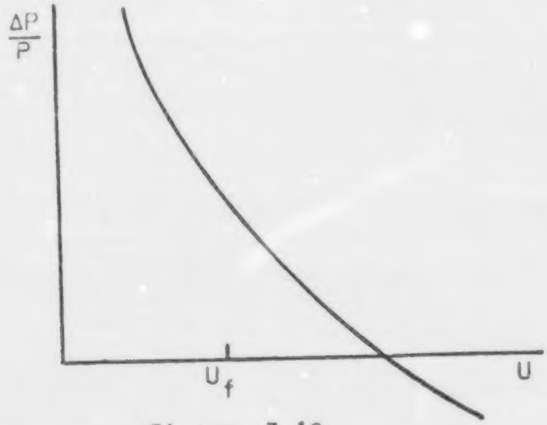


Figure 3.10

c. Two features of the Phillips Curve which should be remembered:

(i) At U_f, the rate of inflation is positive. This is because of the inflationary bias discussed above.

(ii) The inflation rate decreases as U increases. This is the inverse (i.e., downward sloping) relationship discussed in the preceding section.

d. A detailed analysis of the Phillips Curve would show that the curve tends to get flatter as U increases and that it can never cross the vertical axis since a negative unemployment rate has no meaning. Consequently, the Phillips Curve is not a straight line, but takes the shape shown in Figure 3.9. For the sake of simplicity, however, the Phillips Curve will be represented by a straight line approximation to the non-linear curve of Figure 3.9. In equation form the Phillips Curve will be written as:

$$\frac{\Delta P}{P} = d - eU.$$

Diagrammatically, this equation takes the form shown in Figure 3.11.

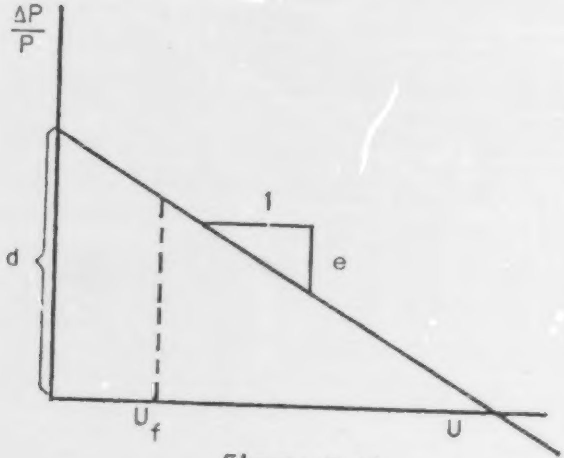


Figure 3.11

e. Sometimes the Phillips Curve does not appear to provide a good explanation for real world events. Occasionally, the economy has mugh higher or lower inflation, given unemployment, than is predicted by a **fixed** Phillips Curve. Some economists interpret this as the result of **shifts** in the Phillips Curve. There are several reasons why the

Phillips Curve might shift up:

(1) There may be a change in people's expectations about future inflation which causes them to do things in the present, such as ask for higher wages, which, in turn, causes prices to rise in the present.

(2) There may be a change in the composition of demand or supply which causes there to be more imbalance than normal across markets in the economy and which, thereby, increases the inflationary bias of the economy.

(3) There may be an increase in the world-wide rate of inflation due to events occuring in other countries which causes prices in the U.S. to rise more rapidly.

Later in the course, those factors which might cause the Phillips Curve to shift will be analyzed in greater detail.

Example: *For the 1960's a fixed Phillips Curve provided a relatively good explanation of real world events, as was seen in Figure 3.9. In the 1970's, however, the inflation rate was much higher than that which the 1960's Phillips Curve predicted. In other words, the Phillips Curve appeared to shift dramatically upward in the early 1970's. This can be seen in Figure 3.12 which compares data from the 1960's with data from the 1970's.*

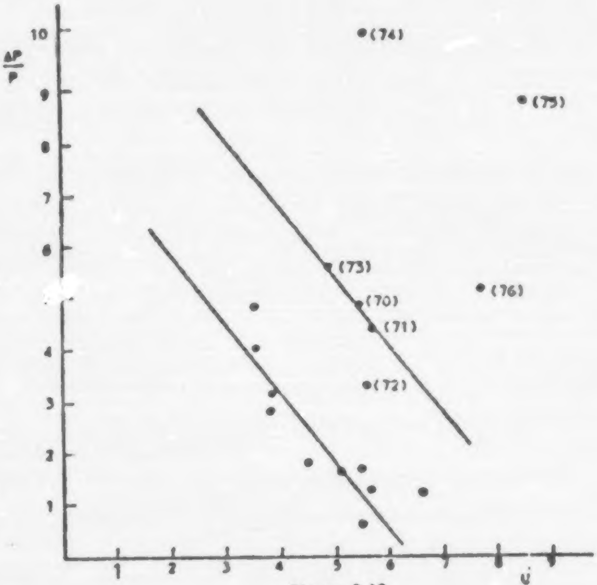


Figure 3.12

> *Data for the years 1970-1973 appear to lie on a Phillips Curve that is substantially higher than the 1960's Phillips Curve, and data for 1974-1976 appear to lie on curves that were even higher.*

f. Algebraically, a shift of the Phillips Curve can be thought of as an autonomous change in the parameter d. A larger d corresponds to a higher Phillips Curve. For the next several sections, the analysis will presume that there is a **given** Phillips Curve for the current period. At a later stage of the course, the problems relating to a shifting Phillips Curve will be reconsidered.

3.2.2. Expanding the model

a. Given the existence of Okun's Law and the Phillips Curve, the unemployment rate and the inflation rate are determined by the level of aggregate demand relative to potential GNP as follows: The level of aggregate demand is determined as in the income-expenditure model. Since potential GNP is predetermined, the level of aggregate demand determines the GNP gap. Following Okun's Law, the size of the % GNP gap determines the unemployment rate. And, as indicated by the Phillips Curve, for that unemployment rate there will be a corresponding rate of inflation.

b. In equation form this can be represented as follows:

Income-expenditure model: $Y^* = \frac{a}{1-b} - \frac{b}{1-b}\bar{T} + \frac{1}{1-b}\bar{I} + \frac{1}{1-b}\bar{G}$

Okun's Law: $U^* = \bar{U}_f + c\left[\frac{\bar{Y}_p - Y^*}{\bar{Y}_p}\right]$

Phillips Curve $\left[\frac{\Delta P}{P}\right]^* = d - eU^*$

c. The way in which unemployment and inflation are determined by the expanded model can be summarized as follows:

(i) Y^* is determined in the income-expenditure model;
(ii) given Y^*, U^* is determined by Okun's Law;
(iii) given U^*, $\frac{\Delta P}{P}$ is determined by the Phillips Curve.

d. The implication of this model for the behavior of unemployment and inflation are as follows:

(i) If aggregate demand exceeds potential GNP, there will be an unusually low unemployment rate and an unusually high inflation rate;

(ii) if aggregate demand equals potential GNP, the unemployment rate will equal U_f, but there will be a positive rate of inflation;

(iii) if aggregate demand falls short of potential GNP, the economy will have high unemployment but low inflation;

(iv) if there is some change in aggregate demand (whether due to the influence of government policy, or changes in consumer or business spending plans), there will be a change in the unemployment and inflation rates.

3.2.3. Choosing target rates of inflation and unemployment

a. As was discussed in section 3.2.1., in any period policy makers will be confronted by a given Phillips Curve. While it may shift over time from one position to another, the present model assumes that it is in a fixed position for the current period. (Later in the course we will consider situations whereby positive actions might be taken to shift the curve.) This means that in the present model policy makers have only a limited set of unemployment and inflation rate combinations to choose from as targets for the current period.

Example: *Suppose the economy has the Phillips Curve in Figure 3.13. This means that the points, like a and d, which lie below and above the curve cannot be achieved in the current period. Points which can be achieved are those, like b and c, which lie on the Phillips Curve.*

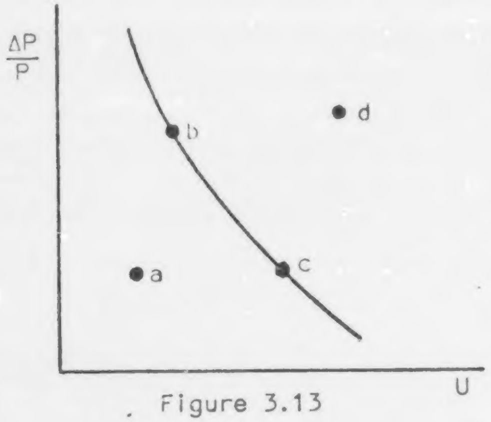


Figure 3.13

b. The policy maker must then decide which of the feasible unemployment-inflation combinations, i.e., which of the points on the Phillips Curve, is best from society's point of view. In comparing any two points on the Phillips Curve, since it is negatively sloped, one point will have higher unemployment, but lower inflation, than the other. When considering whether to move the economy from one point to another, the policy maker must judge whether the decrease in unemployment (or inflation) makes society better off by more than the increase in inflation (or unemployment) makes society worse off.

Example: *In Figure 3.14 two points (b and c) on the Phillips Curve are labelled. In trying to choose the best of all possible points the policy maker must be able to say which of any two points, such as b and c, is preferred. If b is preferred to c, then a movement from b to c involves a loss in social welfare due to the increase in unemployment that exceeds the gain in social welfare due to the decrease in inflation.*

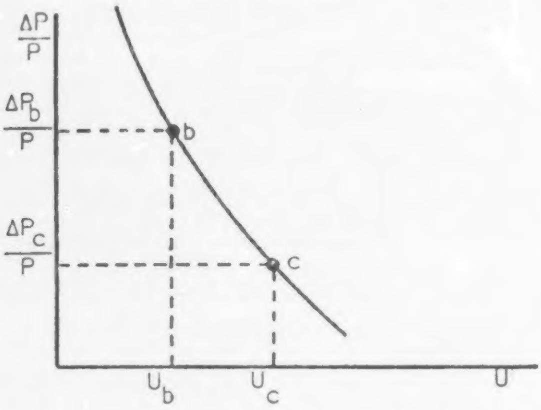


Figure 3.14

c. The point on the Phillips Curve preferred to all other points on the Phillips Curve is the one which maximizes social welfare as judged by policy makers. It is the responsibility of policy makers, within the political system, to make such subjective judgments. The point selected is the one toward which policy makers will try to move the economy. In other words, the point on the Phillips Curve which maximizes social welfare defines the target rates of unemployment and inflation which policy makers will try to achieve by manipulating the instrument variables under their control.

Example: *An example of a social welfare function for which unemployment and inflation rates are target variables is the following:*

$$W = -U - \frac{\Delta P}{P}.$$

This function shows the value of W, an indicator of social welfare, for various feasible combinations of $\frac{\Delta P}{P}$ *and U. The higher U, given* $\frac{\Delta P}{P}$*, and the higher* $\frac{\Delta P}{P}$*, given U, the lower will be W. The point on the Phillips Curve which maximizes the policy maker's social welfare function is the desired or target combination of U and* $\frac{\Delta P}{P}$

d. As much as policy makers might like to move the economy toward the origin, where inflation and unemployment rates are both zero, the best they can do is move the economy along the Phillips Curve to the point on it which is preferred to all other points on it. In section 4, the ways in which the government can use its budget decisions to deal with inflation and unemployment will be analyzed.

Example: *In Figure 3.15 three points are indicated -- (0,0), (3,5), and (4,3). In terms of the social welfare function in the preceding example, the corresponding W for each of these points is 0, -8, and -7. Clearly the point (0,0) would be preferred among the three but it is unattainable because it is off the Phillips Curve. As between the two points on the Phillips Curve, (4,3) is preferred to (3,5) because it yields a higher W, -7 as compared to -8.*

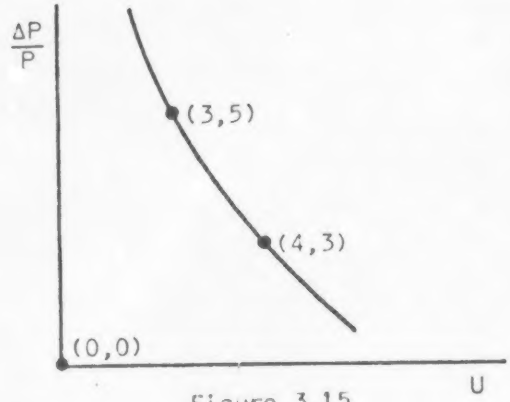


Figure 3.15

MACRO UNIT 4

USING THE EXPANDED MODEL FOR POLICY-MAKING

4.1 Fiscal Policy
4.2 The Balanced Budget Multiplier
4.3 Choosing the Size of the Budget Deficit or Surplus
4.4 Endogenous Taxes

4. USING THE EXPANDED MODEL FOR POLICY-MAKING

4.1. Fiscal Policy

4.1.1. Fiscal policy objectives

a. As was discussed in section 1, government expenditure is a major component of gross national expenditure and net taxes are an important determinant of the distribution of gross national income among households, businesses, and government. As a consequence, as was demonstrated in section 2, these variables, which comprise the government budget, are instrument variables which influence the equilibrium values of target variables. In other words, how the government formulates its **fiscal policy** will have an effect on aspects of the economy of interest to policy makers.

Definition: **Fiscal policy** -- decisions made by the government about the levels of government expenditure and net taxes.

Example: The decision to increase government expenditure substantially during World War II and the Vietnam War was a major element in the government's fiscal policy during those periods. Those decisions had a great impact on the economy in general as well as the country's ability to carry out its defense policy.

b. Given that fiscal policy has an effect on various endogenous economic variables, the question arises as to what the government's goals or objectives should be with respect to those variables. That is, what should be the policy maker's target variables and for what values of those target variables should the policy maker be aiming?

Example: In making a decision about whether to raise or lower taxes, or to make no change, a prior decision must be made about the purposes of fiscal policy. Should taxes be adjusted to achieve a balanced budget? to avoid inflation? to eliminate unemployment? Without answers to these kinds of questions, it would be impossible to make a rational decision about taxes.

c. Questions about the goals of fiscal policy do not fall exclusively within the area of economists' professional competence. The answers to these questions involve value judgments which must be made within the political system. In a representative democracy, like the U.S., it is the responsibility of elected officials and their appointees to formulate the objectives of fiscal policy. While there may be disagreement among individuals about the goals of fiscal policy, a compromise is inevitably arrived at through the workings of the political process.

Example: *Typically, discussion about fiscal policy by Congressmen and the Administration indicates that most policy makers have many goals for fiscal policy. The disagreement that exists lies not so much in identifying target variables, but in determining which ones are most important. In terms of a social welfare function of the following form:*

$$W = -aU - b\frac{\Delta P}{P} - c(G-T) - dG$$

debate among politicicians about fiscal policy can be interpreted as disagreement about the size of the parameters a, b, c, and d. Those who argue that government has become too big and that both G and T should be cut back are arguing that the parameter d contained in the policy maker's representation of the social welfare function is too small. Those who emphasize that the budget should be balanced are implicitly arguing for a higher value on the c parameter in the welfare function than is being used by policy makers.

d. With the help of economic analysis of the kind developed in section 3, politicians have come to see that fiscal policy can have an important effect on the rates of inflation and unemployment. Through their effects on aggregate demand, the levels of government expenditure and net taxes will influence what point on the Phillips Curve the economy will converge to in any time period. As a consequence, in formulating fiscal policy, given any other economic policies which might influence aggregate demand, policy makers must decide which point on the Phillips Curve is best. That is, they must decide which attainable combination of unemployment and inflation rates is least undesirable.

e. Fiscal policy also has an effect on endogenous variables other than aggregate demand, unemployment, and inflation. The importance of some of these and their relevance for economic policy will be discussed in subsequent sections. At this point, however, the discussion will abstract from these other effects and focus on the connection between fiscal policy, on the one hand, and aggregate demand, unemployment and inflation, on the other. The reason for this is to facilitate an understanding of this connection which is generally regarded to be the most important aspect of fiscal policy.

f. The value judgments of policy makers can be expressed in terms of a social welfare function. One objective, then, is to formulate a fiscal policy which will move the economy to the point on the Phillips Curve which maximizes the social welfare function. In arguing about the desirability of any fiscal policy, one source of disagreement can be a difference of opinion about what should be the social welfare function, i.e., about whether inflation or unemployment is the greater evil. Even if there is agreement on the objectives of fiscal policy, there can be disagreement about which policy will best achieve those objectives. The following sections are concerned with the problems of how to decide about G and T, given an agreed-upon social welfare function.

4.1.2. Choosing a target level of aggregate demand

a. Assuming that policy makers are confronted by a given Phillips Curve, they must make a decision about where they would like to be on that Phillips Curve. That is, which of the feasible combinations of U and $\frac{\Delta P}{P}$ should the government try to bring about through its fiscal policy? Once that decision is made, the next step for policy makers is to determine what levels of aggregate demand will lead to a realization of the desired combination of unemployment and inflation. This is because fiscal policy influences the point on the Phillips Curve to which the economy will converge through its effect on aggregate demand.

b. The level of aggregate demand that corresponds to the desired point on the Phillips Curve can be found by making use of Okun's Law, the relationship between unemployment and the output gap. Okun's Law states that

$$U^* = U_f + c\left[\frac{Y_p - Y^*}{Y_p}\right].$$

That is, the equilibrium unemployment rate is equal to the full employment unemployment rate plus an amount which depends on the percentage gap between aggregate demand and potential GNP. The amount of unemploy[illegible] is inversely related to the level of aggregate demand. The higher the level of aggregate demand, the lower will be the level of unemployment, ceteris paribus. Anything which increases the rate of total spending in the economy should reduce the level of unemployment. If the policy maker knows c and Y_p, he can use this relationship to find the Y^* which corresponds to the desired or target unemployment rate.

c. Let the subscript t denote the target level of a variable. Then by using Okun's Law, it is possible to find the target level of aggregate demand, Y_t^*, in terms of the target unemployment rate, U_t^*. Remember U_t^* is given by the point on the Phillips Curve which is preferred to all other points on the Phillips Curve, i.e., the point on the Phillips Curve which maximizes social welfare. What we are doing here is asking ourselves this question: If we have to endure some combination of both inflation and unemployment, which combination makes us the least worse off? The answer to that question gives us our target level of unemployment, and putting this unemployment figure together with Okun's Law give us our target level of aggregate demand or equilibrium GNP. By algebraic manipulation, the relationship

$$U_t^* = U_f + c\,\frac{Y_p - Y_t^*}{Y_p}$$

implies the following relationship:

$$Y_t^* = Y_p - \frac{1}{c}\,(U_t^* - U_f)\,Y_p.$$

Example: *Suppose that after considering possible combinations of inflation and unemployment for our economy, the policy maker decides that the least undesirable situation involves an unemployment rate of 6%. The target level of unemployment,* U_t^*, *is then .06. If a 5% unemployment rate is considered to be "full employment", and if the economy could produce a GNP of 1500 at full employment, then* U_t *is .05 and* Y_p *is 1500. Finally, suppose that historical experience suggests that the "c" in Okun's Law is about 1/3 for the economy.*

Substituting these values in the above equation,

$$Y^*_t = 1500 - 3(.06 - .05)\ (1500)$$
$$= 1500 - 45$$
$$= 1455.$$

In other words, if the policy maker can manipulate the level of total spending in the economy to produce an aggregate demand of 1455, then the resulting rate of unemployment should be about 6%. How can the policy maker manipulate the amount of total spending in the economy? The most direct method is the use of fiscal policy, i.e., adjusting levels of government spending and taxation.

d. It should be noted that the choice of a U_t which is different from U_f implies that Y^*_t will be different from Y_p. The reason why policy makers might seek a Y^* less than Y_p is that the inflation that would result at Y_p might be greater than acceptable, given the policy makers' social welfare function.

Example: *During the Nixon-Ford Administration in the early 1970's, it was clearly stated that the Administration's* Y^*_t *was less than* Y_p *because of the desire to lessen the rate of inflation. This was during the period after the Phillips Curve had shifted upward dramatically.*

e. The relationship between the Phillips Curve and Okun's Law can be summarized in terms of a graph. Figure 4.1a is a Phillips Curve for an economy. Figure 4.1b is a graphic representation of Okun's Law applied to many possible target levels of unemployment; it shall be referred to as the Okun relationship. The line denotes possible combinations of target unemployment rates (U_t) and the corresponding levels of equilibrium GNP (Y^*_t) in an economy where the definition of "full employment" and the GNP that could be produced at full employment (U_f and Y_p) are held constant. In making policy decisions which affect the levels of inflation and unemployment in an economy, policy makers are assumed to go through a three-step process:

(1) Given that it is necessary to endure some combination of inflation and unemployment, the policy maker must choose the point on the Phillips Curve considered to be least

undesirable. Selection of a point such as R_2 on the Phillips Curve in Figure 4.1a determines the economy's target rate of unemployment. At point R_2, $U_2 = U_t^*$.

(2) Given U_t^* it is possible to use the Okun relationship in Figure 4.1b to determine the level of equilibrium GNP which yields the target rate of unemployment. That particular GNP then becomes the target GNP, Y_t^*. In Figure 4.1b, if the target rate of unemployment is U_2, then point R_2' shows the target level of GNP, Y_2^*.

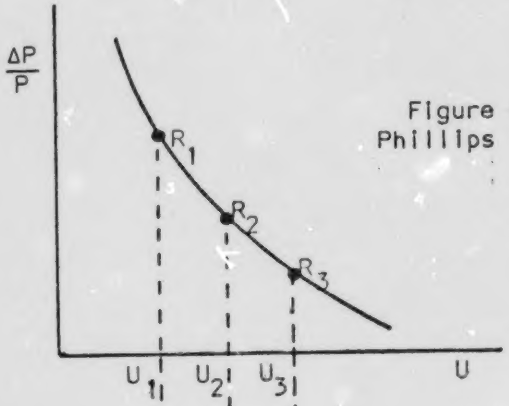


Figure 4.1a
Phillips Curve

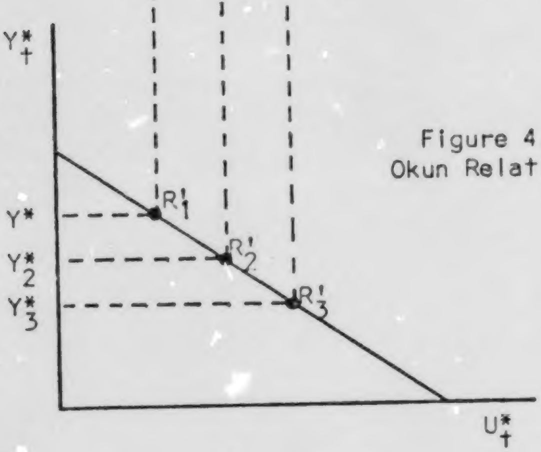


Figure 4.1b
Okun Relationship

Notice from the graph of the Okun relationship that the lower the target rate of unemployment, the higher will be the level of GNP required to obtain that target. The level of GNP required to yield an unemployment rate of

U_3 (Y_3) is less than the GNP required to yield a lower unemployment rate U_1 (Y_1) since more spending is required to create more jobs as the amount of tolerable unemployment falls.

(3) Given a $Y^*_\dagger$ which corresponds to the desired point on the Phillips Curve, the policy maker's problem then becomes one of choosing a budget which is consistent with that target level of aggregate demand. If the policy maker solves this problem, then he will have chosen a fiscal policy which will achieve the target level of aggregate demand which in turn will achieve the target unemployment rate. In other words, the policy maker will have used fiscal policy to achieve the desired point on the Phillips Curve.

4.1.3. Choosing the levels of the instrument variables.

a. Given the target level of aggregate demand, $Y^*_\dagger$, determined by the procedure spelled out in sections 4.1.1 and 4.1.2, the policy maker can then use the income-expenditure model to find values of $\bar{T}$ and $\bar{G}$ which, given the values of other exogenous variables, will yield $Y^*_\dagger$. It is possible to find these values by considering the reduced form equation for Y^*:

$$Y^* = \frac{a}{1-b} + \frac{1}{1-b}\bar{I} + \frac{1}{1-b}\bar{G} - \frac{b}{1-b}\bar{T} \qquad (5)$$

This equation gives the equilibrium level of aggregate demand in terms of the parameters of the income-expenditure model (a and b) and the values of the exogenous variables ($\bar{I}$, $\bar{G}$, and $\bar{T}$). If the government knows a, b, and $\bar{I}$, it can choose levels of $\bar{G}$ and $\bar{T}$ which make Y^* equal to $Y^*_\dagger$. It is assumed that the government will know the values of a, b, and $\bar{I}$. One of the economist's contributions to policy making is undertaking research which provides estimates of a and b and forecasts of $\bar{I}$.

b. If the policy maker wanted to use government expenditure as the instrument variable to achieve $Y^*_\dagger$, then he would simply choose the value of $\bar{G}$ which would yield a value of $Y^*_\dagger$ in the reduced form equation for Y^*. This can be seen diagrammatically in Figure 4.2. The Line $C = a + bY - b\bar{T}$

shows the level of consumption expenditure which will obtain for any value of Y. The line $C + \bar{I}$ shows the level of consumption plus investment expenditure which will obtain for any value of Y. The problem is to find the value for $\bar{G}$ which will yield Y^*_t as the equilibrium value for Y. The solution is the value for $\bar{G}$ which will cause the $C + I + \bar{G}$ line to intersect the $E = Y$ line at the point where $Y = Y^*_t$. This of course is the difference between Y^* and the level of $C + \bar{I}$ which will obtain at Y^*_t as shown by the vertical difference between the $C + \bar{I}$ line and $C + \bar{I} + \bar{G}$ line in the diagram. In other words, $\bar{G}$ must be just sufficient to make $C + \bar{I} + \bar{G}$ add up to Y^*_t.

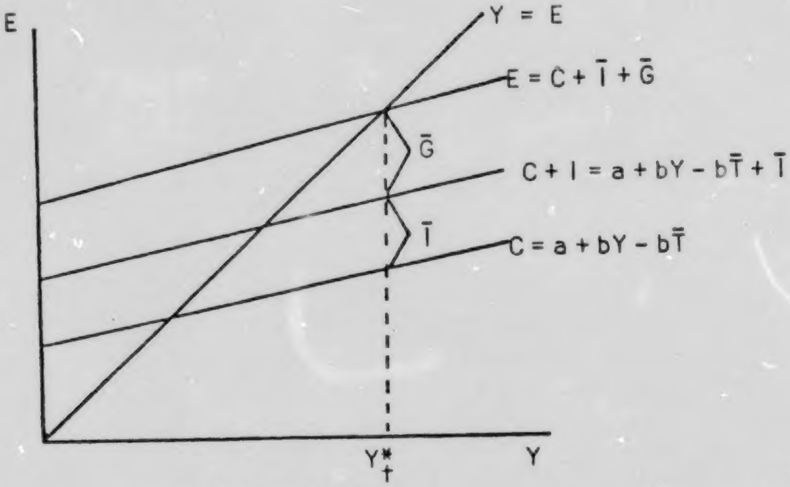


Figure 4.2

Example: *Suppose* $Y^*_t = 1400$, $a = 100$, $b = .75$, $\bar{I} = 250$ *and* $\bar{T} = 200$. *In order for the economy to be in equilibrium when* $Y = Y^*_t$, *it is necessary for desired* $C + \bar{I} + \bar{G}$ *to be equal to* Y^*_t. *If Y were equal to* Y^*_t, *then desired consumption expenditure is given by*

$$C = a + b(Y - T)$$
$$= 100 + .75\ (1400 - 200)$$
$$= 1000.$$

Since desired $I = 250$, *then* $C + \bar{I}$ *would be 1250, if* $Y = 1400$. *In order for Y to be an equilibrium Y at 1400,* $C + \bar{I} + \bar{G}$ *would have to equal 1400 when* $Y = 1400$. *That is,* $\bar{G}$ *would have to be 150.*

c. It is useful to think about the same problems in terms of changes in $\bar{G}$ from existing levels. If aggregate demand is at a level which is different from Y^*_t, by how much should it be changed to achieve Y^*_t? In terms of the reduced form equation for Y^*, for given levels of $\bar{I}$ and $\bar{T}$,

$$\Delta Y^* = \frac{1}{1-b}\,\Delta\bar{G}.$$

This implies that to achieve a change in Y^* from the initial level, Y^*_1, to the target level, Y^*_t, it is necessary to change $\bar{G}$ by (1-b) times that amount. In terms of Figure 4.3, Y^*_1 is the initial level of Y and Y^*_t the target level. The change in G required is indicated by ΔG, i.e., the change necessary to shift the $C + \bar{I} + \bar{G}$ line to the position where it intersects the Y = E line at Y^*_t.

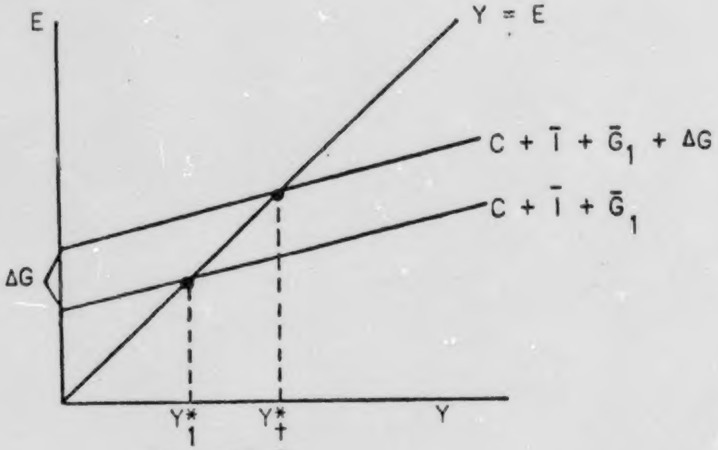


Figure 4.3

Example: *Assume the following values for an economy:*
$C = 50 + .8(Y - \bar{T})$, $\bar{I} = 110$, $\bar{G} = 200$, $\bar{T} = 200$, *and*
$Y_t = Y_p = 1100$.
How should the government adjust its spending policies to make actual GNP equal full-employment, target GNP ($Y^* = Y_p$)?

First, find Y^* for this economy:

$$Y^* = C + \bar{I} + \bar{G}$$
$$Y^* = 50 + .8(Y^* - 200) + 110 + 200$$
$$Y^* = 360 + .8Y^* - 160$$
$$Y^* = 200 + .8Y^*$$
$$.2Y^* = 200$$
$$Y^* = 1000.$$

Next, determine how much government spending must be increased to make $Y^* = 1100$:

$$\Delta Y^* = \frac{1}{1-b}\,\Delta\overline{G}$$

$$100 = \frac{1}{1-.8}\,\Delta\overline{G}$$

$$100 = 5\Delta\overline{G}$$

$$\Delta\overline{G} = 20$$

In other words, if government spending is increased by 20 (from 200 to 220), then Y^* will increase by 100 (from 1000 to 1100). The required change in government spending is smaller than the desired change in GNP because of the government spending multiplier.

d. The same analysis can be used to find the level of $\overline{T}$ which, for given levels of $\overline{I}$ and $\overline{G}$, will achieve Y^*_t. In terms of changes in $\overline{T}$ from existing levels, to bring about a change in Y^* from its initial level to Y^*_t, it is clear from the above equation that for constant $\overline{I}$ and $\overline{G}$

$$\Delta Y^* = \frac{b}{1-b}\,\Delta\overline{T}$$

Therefore, if the policy maker wants to increase Y^* by a certain amount by changing taxes, it is necessary to reduce taxes by $\frac{1-b}{b}$ times that amount.

Example: *Suppose the government wants to increase Y^* by 150 by changing $\overline{T}$. Suppose its estimate of b is .75. Then, since*

$$\Delta Y^* = \frac{b}{1-b}\,\Delta\overline{T}$$

$$= -\frac{.75}{.25}\,\Delta\overline{T}$$

$$= -3\Delta\overline{T},$$

in order to make $\Delta Y^* = 150$, $\Delta\overline{T}$ must equal $-\frac{1}{3}\Delta Y^*$ or -50. If $\Delta\overline{T} = -50$, then

$$\Delta Y^* = -3\ (-50)$$

$$= 150.$$

e. Diagrammatically, the effect of a change in taxes can be seen in Figure 4.4. The solid lines show the relationship between C and Y, and E and Y, before the tax change. The dashed lines show these relationships after a reduction in taxes of $\Delta\bar{T}$. Both the C line and E line shifted up by the amount $-b\Delta\bar{T}$ to C_2 and E_2, resulting in an increase in Y* of $-\frac{b}{1-b}\Delta\bar{T}$ from $Y_1{}^*$ to $Y_2{}^*$.

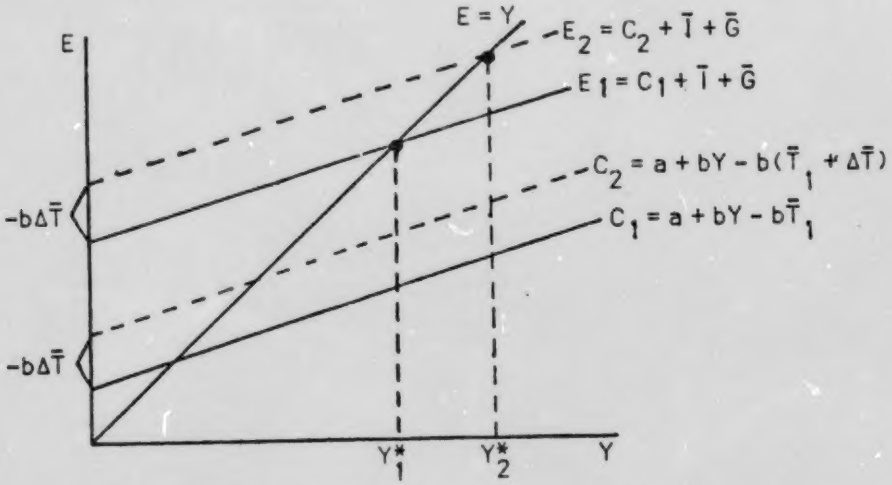

E = Y
$E_2 = C_2 + \bar{I} + \bar{G}$
$E_1 = C_1 + \bar{I} + \bar{G}$
$C_2 = a + bY - b(\bar{T}_1 + \Delta\bar{T})$
$C_1 = a + bY - b\bar{T}_1$
E
$-b\Delta\bar{T}$
$-b\Delta\bar{T}$
Y^*_1
Y^*_2
Y

Figure 4.4

Example: *Suppose President Carter's proposed tax rebate of \$50 per person had been enacted into law. The effect would have been to shift up the C line and the E line. Originally, Carter's estimates of a and b and his forecast for* $\bar{I}$ *indicated that the rebate would be necessary to increase* Y^* *to* Y^*_t. *Changes in these estimates and forecasts, however, led him to conclude that the tax rebate was not necessary to bring* Y^* *up to* Y^*_t, *but in fact would have driven* Y^* *above* Y^*_t.

4.2. The Balanced Budget Multiplier

4.2.1. The government expenditure and tax multipliers differ

a. As can be seen in the discussion of section 4.1.4, the $\bar{G}$ and $\bar{T}$ multipliers are not equal. A change in government expenditure, ceteris paribus, results in a change in aggregate demand equal to $\frac{1}{1-b}$ times the change in government expenditure, whereas a change in taxes, ceteris paribus, results in a change in aggregate demand equal to $-\frac{b}{1-b}\Delta\bar{T}$. The difference can be seen clearly in equation form:

$$\Delta Y^* = \frac{1}{1-b}\Delta\bar{G}, \text{ for given } \bar{I} \text{ and } \bar{T};$$

$$\Delta Y^* = -\frac{b}{1-b}\Delta\bar{T}, \text{ for given } \bar{I} \text{ and } \bar{G}.$$

b. One respect in which the multipliers differ relates to their signs. The $\bar{G}$ multiplier, $\frac{1}{1-b}$, is positive, and the $\bar{T}$ multiplier, $-\frac{b}{1-b}$, is negative. The reason for this is the way these variables affect the income-expenditure process. Government expenditure adds directly to the flow of total expenditure. Consequently, $\bar{G}$ has a multiplier with a positive sign; an increase in $\bar{G}$ can be expected to lead to an increase in Y^*. Taxes, however, subtract indirectly from the flow of total expenditure by reducing disposable personal income and, therefore, consumption expenditure. Consequently, $\bar{T}$ has a multiplier with a negative sign; an increase in $\bar{T}$ can be expected to lead to a decrease in Y^*.

c. Another respect in which the multipliers differ relates to their absolute values. The absolute value of the $\bar{G}$ multiplier, $\frac{1}{1-b}$, is greater than the absolute value of the $\bar{T}$ multiplier, $\frac{b}{1-b}$. (Remember b, the marginal propensity to consume, is greater than 0 and less than 1.) The reason for this is that **all** of an increase in G is added initially to the expenditure flow, while only a fraction -- equal to b, the marginal propensity to consume -- of a decrease in taxes is added initially to the expenditure flow. In each case the ultimate increase in Y^* is equal to $\frac{b}{1-b}$ times this initial increase in expenditure. This implies that the absolute values of the multipliers are $\frac{1}{1-b}$ in the government expenditure case and $\frac{1}{1-b} \times b$, or $\frac{b}{1-b}$, in the tax case.

Example: *If* $b = .8$, *then the government expenditure multiplier is* $\frac{1}{1-.8} = \frac{1}{.2} = 5$, *while the tax multiplier is* $\frac{.8}{1-.8} = \frac{.8}{.2} = -4$. *The multipliers have the opposite sign and have unequal absolute values.*

4.2.2. Equal changes in $\bar{G}$ and $\bar{T}$

a. Since the $\bar{G}$ and $\bar{T}$ multipliers differ in sign, then equal changes in these instrument variables will tend to be partially offsetting. It is not true, however, as might at first be expected, that the effects of an increase in $\bar{G}$ and an increase in $\bar{T}$ will be **exactly** offsetting. This follows from the fact that these multipliers have different absolute values. Because the $\bar{G}$ multiplier is greater in absolute value than the $\bar{T}$ multiplier, the effect of equal increases in $\bar{G}$ and $\bar{T}$ is to increase Y^*. That is, the increase in Y^* due to the increase in $\bar{G}$ will be only partially offset by the decrease in Y^* due to the increase in $\bar{T}$.

Example: *If $\bar{G}$ and $\bar{T}$ are both increased by 10, and $b = .8$, the effect of increasing $\bar{G}$ is to raise Y^* by $5 \times 10 = 50$ and the effect of increasing $\bar{T}$ is to lower Y^* by $4 \times 10 = 40$. The combined effect is to increase Y^* by 10.*

b. By using the income-expenditure model it is possible to see by how much an equal increase in $\bar{G}$ and $\bar{T}$ will increase Y^*. Using the reduced form equation for Y^* once again, it is possible to obtain the following expression for ΔY^*:

$$\Delta Y^* = \frac{1}{1-b}\Delta\bar{G} - \frac{b}{1-b}\Delta\bar{T}, \text{ for constant } \bar{T}.$$

If $\bar{G} = \bar{T}$, then by substituting $\bar{G}$ for $\bar{T}$ yields:

$$\begin{aligned}\Delta Y^* &= \frac{1}{1-b}\Delta\bar{G} - \frac{b}{1-b}\Delta\bar{G}\\ &= \frac{1}{1-b} - \left[\frac{b}{1-b}\right]\Delta\bar{G}\\ &= \frac{1-b}{1-b}\Delta\bar{G}\\ &= \Delta\bar{G}.\end{aligned}$$

That is, the effect of an equal increase in government spending (G), and taxes (T) on national income (Y^*) is precisely equal to the initial change in taxes and government spending. In other words, the balanced budget multiplier is equal to 1. This result does **not** depend on any of the "parameters" in the economic system. For example, it does not even depend on the value of the marginal propensity to consume. Thus, the stimulatory effect of an equal increase in government spending and taxes is the same in an economy with a high MPC as in one with a low MPC.

Example: *That the balanced budget multiplier is 1 can be seen in the previous example. An increase in $\bar{G}$ and $\bar{T}$ of 10, with $b = .8$, led to an increase in Y^* of 10. If b were assumed to be another value, say .75, the result would have been the same. In that case:*

$$\Delta Y^* = \frac{1}{1-.75} \times 10 - \frac{.75}{1-.75} \times 10 = (4 \times 10) - (3 \times 10) = 10.$$

c. In sections b and c above, the effect of increasing $\bar{G}$ and $\bar{T}$ equally was analyzed. Obviously, the effect of decreasing $\bar{G}$ and $\bar{T}$ equally will have the opposite effect, namely, to decrease Y^*. As indicated in section 4.2.1, a reduction in $\bar{T}$, with $\bar{G}$ constant, will increase Y^*. However, a reduction in $\bar{T}$ with an equal reduction in $\bar{G}$, will decrease Y^*.

Example: *It is sometimes argued by politicians that it is cnly appropriate to "stimulate the economy" (i.e., increase aggregate demand) by decreasing taxes if such a decrease is accompanied by an equal decrease in government expenditure. It follows from the analysis above, however, that such a policy would decrease aggregate demand rather than increase it.*

4.2.3. Implications of fiscal policy for budgetary balance

a. In section 4.1 it was demonstrated that by controlling the level of government expenditure or net taxes it is possible to control the level of aggregate demand. As a result, it is possible to use fiscal policy to influence aggregate demand so as to achieve the preferred point on the Phillips Curve. It was also demonstrated that it is possible to achieve a target Y^* by changing $\bar{T}$ or $\bar{G}$. It is also possible to achieve the same Y^*_t by a combination of $\bar{G}$ and $\bar{T}$ changes. This implies that there are many $\bar{G}$ and $\bar{T}$ combinations, for a given $\bar{I}$, which will generate Y^*_t.

b. There is always one $\bar{G}$ and $\bar{T}$ combination which will yield Y^*_t for which $\bar{G}$ and $\bar{T}$ and equal. That is, for a given $\bar{I}$, there is a balanced budget at some level of $\bar{G}$ and $\bar{T}$ which will yield the policy maker's target level of aggregate demand. This can be seen from the reduced form equation for Y^* as follows:

$$Y^* = \frac{a}{1-b} + \frac{1}{1-b}\bar{I} + \frac{1}{1-b}\bar{G} - \frac{b}{1-b}\bar{T}.$$

Set $Y^* = Y^*_t$ and $\bar{G} = \bar{T}$:

$$Y^*_t = \frac{a}{1-b} + \frac{1}{1-b}\bar{I} + \bar{G}.$$

Solve for $\bar{G}$:

$$\bar{G} = Y^*_t - \frac{a}{1-b} - \frac{1}{1-b}\bar{I}.$$

This is the size of the balanced budget which will yield Y^*_t.

Example: *Suppose* $a = 50$, $b = .8$, *and* $\bar{I} = 100$. *Suppose* $Y_t^* = 1000$. *The balanced budget which will yield a* $Y^* = 1000$ *is given by the equation*

$$\begin{aligned}\bar{G} &= Y_t^* - \frac{a}{1-b} - \frac{1}{1-b}\bar{I} \\ &= 1000 - \frac{50}{1-.8} - \frac{1}{1-.8} x\ 100 \\ &= 1000 - 250 - 500 \\ &= 250\end{aligned}$$

That is, if $\bar{G}$ *and* $\bar{T}$ *are set equal to 250, then there will be a balanced budget and aggregate demand will equal the policy maker's target level.*

c. The idea that any target level of GNP can be achieved with a balanced budget is an important one, and can be shown graphically. Recall from 4.2.3.b that when $\bar{G} = \bar{T}$, the reduced form equation for Y_t^* becomes

$$Y_t^* = \frac{a}{1-b} + \frac{1}{1-b}\bar{I} + \bar{G}.$$

If investment spending is held constant, the equation above has the form

$$Y_t^* = A + \bar{G}$$

$$\text{where } A = \frac{a}{1-b} + \frac{1}{1-b}\bar{I} = \frac{a+\bar{I}}{1-b}$$

So for a given level of investment spending, the relationship between Y_t^* and $\bar{G}$ is linear in a model which requires that $\bar{G} = \bar{T}$, i.e., which requires that the government have a balanced budget. This is shown in Figure 4.5.

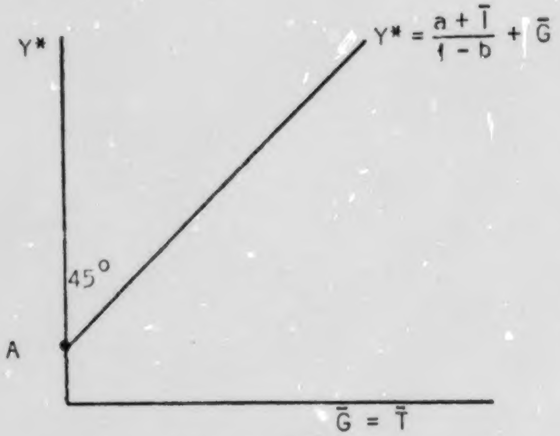


Figure 4.5

Two features about this graph should be noted. First, the vertical intercept A has the value $\frac{a+\bar{I}}{1-b}$. Thus, if businesses decide to undertake more investment spending, the entire line would be shifted upward (like a shift from ℓ_1 to ℓ_2 in Figure 4.6c below). Second, the slope of the line (the coefficient of $\bar{G}$ in the equation) has the value of unity. In other words, if $\bar{G}$ (and therefore $\bar{T}$) is increased by 15, Y* will increase by 15. If $\bar{G}$ and $\bar{T}$ are decreased by 6.7, Y* will decrease by 6.7. This result should have been predicted because of the discussion of the balanced budget multiplier in section 4.2.

d. Given the relationship between balanced government budgets and equilibrium GNP, it is possible to integrate the earlier analysis of the Phillips Curve and the Okun relationship to see how policy makers can:

   (1) determine a target level of unemployment by considering the Phillips Curve;

   (2) use the Okun relationship to determine the corresponding target level of GNP; and

   (3) use the relationship between levels of a balanced budget and levels of GNP to determine how $\bar{G}$ and $\bar{T}$ could be chosen to attain the target level of GNP with a balanced budget.

Figure 4.6 presents the Phillips Curve (Figure 4.6a), the Okun relationship (Figure 4.6b), and the relationship between levels of a balanced budget and corresponding levels of GNP. (Figure 4.6c). Policy makers begin their three-step process in Figure 4.6a by choosing the least undesirable combination of inflation and unemployment at point R_1. This determines the target rate of unemployment, U_1. When this unemployment rate is projected onto Figure 4.6b, the Okun relationship shows a target equilibrium GNP of Y_1^*. Transferring the value Y_1^* over to Figure 4.6c, it is seen that the government should set the levels of both government spending and taxation at G_1 in order to have a GNP of Y_1 (which yields an unemployment rate of U_1) and a balanced budget.

How would this scenario be different if businesses suddenly decided to undertake more investment spending at all levels of GNP? This would shift line ℓ_1 in Figure 4.6c upward to some position such as ℓ_2 because the value of the vertical intercept is now larger. In this new situation, the government is now able to achieve Y_1 and U_1 with smaller

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levels of $\bar{G}$ and $\bar{T}$ (G_2) and still have a balanced budget. Ceteris paribus, the more spending done by businesses (and/or households), the lower are the levels of $\bar{G}$ and $\bar{T}$ necessary to maintain a particular level of GNP. Note that more spending by consumers would shift line ℓ_1 upwards in Figure 4.6c, since the intercept term contains the parameter a from the household consumption function.

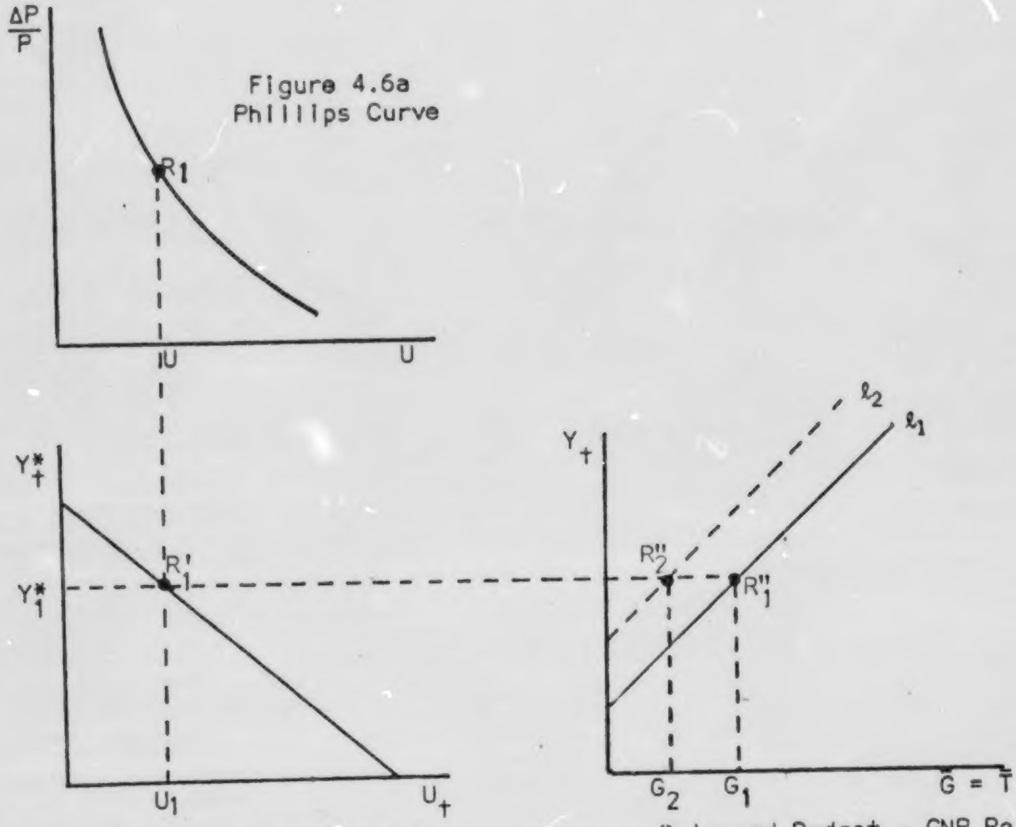
$\frac{\Delta P}{P}$
R_1
U
U
Y^*_t
Y^*_1
R'_1
U_1
U_t
Y_t
ℓ_2
ℓ_1
R''_2
R''_1
G_2
G_1
$\bar{G} = \bar{T}$

Figure 4.6a
Phillips Curve

Okun Relationship
Figure 4.6b

Balanced Budget - GNP Relationsh
Figure 4.6c

4.3. Choosing the Size of the Budget Deficit or Surplus

4.3.1. The range of budgets consistent with Y_t^*

a. It has been shown in preceding sections that there are many different $\bar{G}$ and $\bar{T}$ combinations which will yield a given Y_t^*. It has also been shown that one of these combinations will involve a balanced budget. Some of the combinations will involve a **budget surplus** and the remaining combinations will involve a **budget deficit.**

Definitions: **Budget surplus** -- the amount by which $\bar{T}$ exceeds $\bar{G}$.
Budget deficit -- the amount by which $\bar{G}$ exceeds $\bar{T}$.

b. That some fiscal policies which will achieve Y_t^* will involve a budget surplus can be seen in terms of the following argument. Consider the balanced budget that will achieve Y_t^*. Now consider increasing $\bar{G}$ by some amount $\Delta\bar{G}$. By how much must $\bar{T}$ be increased to keep Y^* from changing? Since the absolute value of the $\bar{G}$ multiplier is greater than that of the $\bar{T}$ multiplier, the increase in $\bar{T}$ must be greater than $\Delta\bar{G}$ to keep Y^* from changing. Consequently, budgets with higher levels of $\bar{G}$ than the balanced budget which will achieve Y_t^* must have a budget surplus if they are to yield Y^* equal to Y_t^*.

Example: *Suppose that $\bar{I} = 100$, $\bar{G} = 250$, and $\bar{T} = 250$. Also, suppose that $a = 50$ and $b = .8$. As worked out in a previous example, these assumptions imply that $Y^* = 1000$. Finally, suppose $Y_t^* = 1000$. This means that the equilibrium* ***aggregate demand*** *equals the target aggregate demand with a balanced* ***budget***. *For this economy, if $\bar{G}$ were higher by 20, how much higher would $\bar{T}$ have to be for Y^* to still be equal to Y_t^*, i.e., 1000? And what would this imply about the size of the budget surplus or deficit? Using the reduced form equation,*

$$Y^* = \frac{a}{1-b} + \frac{1}{1-b}\bar{I} + \frac{1}{1-b}\bar{G} - \frac{b}{1-b}\bar{T}$$

it is possible to find the value of $\bar{T}$ which will yield a $Y^* = 1000$ for $G = 270$, as follows

$$1000 = \frac{50}{1-.8} + \frac{1}{1-.8} x\ 100 + \frac{1}{1-.8} x\ 270 - \frac{.8}{1-.8} x\ \overline{T}$$

$$1000 = 250 + 500 + 1350 - 4 x\ \overline{T}$$

$$4\overline{T} = 1100$$

$$\overline{T} = 275$$

In words, $\overline{T}$ *would have to be higher by 25 if* $\overline{G}$ *were higher by 20 in order for* Y^* *to remain at 1000. That is, for this higher* $\overline{G}$, *a budget surplus is required to achieve* Y^*_t.

c. It can easily be seen, using the same line of argument, that a budget with a lower $\bar{G}$ -- i.e., lower than in the balanced budget which will achieve Y^*_t -- must have a budget deficit if it is also to generate a Y^* equal to Y^*_t. That is, a budget with a lower $\bar{G}$ must have an even greater reduction in $\bar{T}$ -- which implies a larger deficit -- to achieve the same Y^*.

d. It is possible to see that there is a range of budget deficits and surpluses consistent with a given Y^* in terms of Figure 4.7. $\bar{G}$ is measured along the vertical axis and $\bar{T}$ along the horizontal axis. The 45° line from the origin represents all the combinations of $\bar{G}$ and $\bar{T}$ which will yield a balanced budget. Any budget below the 45° line has a surplus and any budget above has a deficit. Only one of these balanced budgets (say A) is consistent with a given Y^*_t. A larger balanced (e.g., B) budget will yield a $Y^* > Y^*_t$, and a smaller balanced budget (e.g., C) will yield a $Y < Y^*_t$. This is a consequence of the balanced budget multiplier: an equal increase in $\bar{G}$ and $\bar{T}$ leads to an increase in Y^* of the same amount.

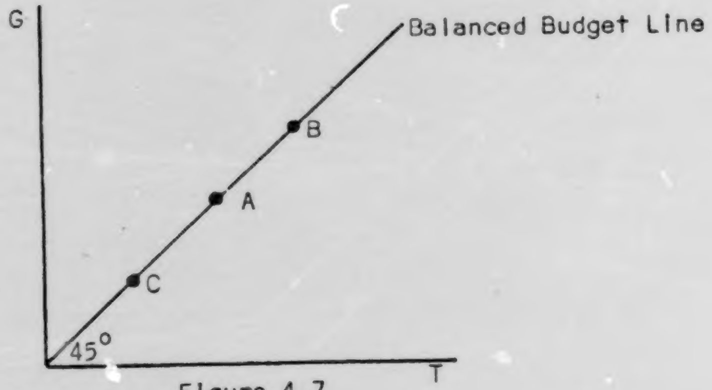

Figure 4.7

e. All of the budgets which yield a given Y_t^* can be portrayed on the same diagram by the line labelled Y_t^*, as shown in Figure 4.8. This line intersects the balanced budget line at A, because A is the single balanced budget which yields the target equilibrium income, i. e., $Y^* = Y_t^*$. But the Y_t^* line is flatter than the balanced budget line. This is the result of the reasoning given in sections b and c above. Consider an increase in $\bar{G}$ from point A. In order to keep Y^* constant it is necessary for $\bar{T}$ to increase by more than $\bar{G}$. Consequently, budgets with a higher $\bar{G}$ that yield a $Y^* = Y_t^*$ must have a surplus and will be on a line which lies below the balanced budget line to the right of A. Similarly, budgets with lower $\bar{G}$ that also yield a $Y^* = Y_t^*$ must have a budget deficit and will be an a line which lies above the balanced budget line to the left of A. Consequently, the Y_t^* line is flatter than the balanced budget line.

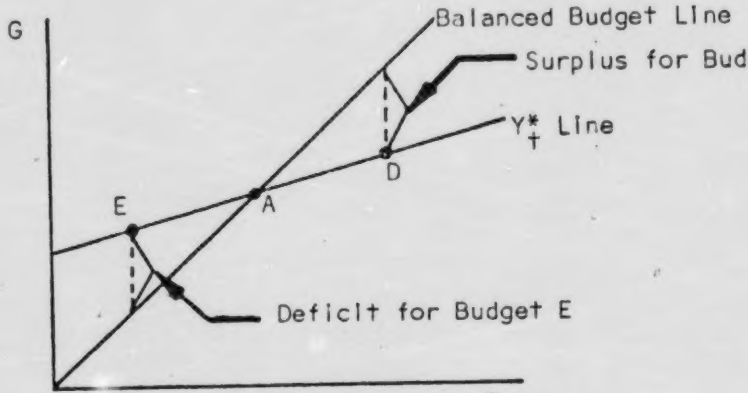

Figure 4.8

f. In Figure 4.8, consider the budget D. This budget lies on the Y_t^* line so it will yield a $Y^* = Y_t^*$. It has a surplus equal to the vertical distance between the balanced budget line and the Y^* line at D. Budget E also yields a $Y^* = Y_t^*$, but it has a deficit equal to the vertical distance between the Y_t^* line at E and the balanced budget line.

4.3.2. Why not always choose the balanced budget which achieves Y_t^*?

a. We have seen that whatever Y_t^* the policy maker might choose, there is always a balanced budget which will generate a Y^* equal to that target level. Not every balanced budget will achieve Y_t^*. Only one particular balanced budget, the one with the appropriate level of $\bar{G}$ and $\bar{T}$, will generate the target level of Y^*.

b. Many people believe, for reasons to be discussed later, that it is better for the government to have a balanced budget than to have a budget surplus or deficit. Given this belief and given that there is a balanced budget which will achieve $Y^*_\dagger$, why shouldn't policy makers always choose that balanced budget as their fiscal policy?

c. If the policy maker's objectives were only the attainment of both $Y^*_\dagger$ and a balanced budget, then the correct policy might be to always choose that balanced budget which achieves $Y^*_\dagger$. If, however, there are other objectives of fiscal policy with which policy makers are concerned, then these objectives may make the balanced budget which achieves $Y^*_\dagger$ less preferable than some other budget, which may have either a deficit or surplus and which also achieves $Y^*_\dagger$.

4.3.3. Budgetary size as an objective of fiscal policy

a. The government does not make expenditure for goods and services primarily to achieve a desired level of Y^*. The principal reason for government expenditure is to provide for consumption and investment which can best be made collectively by the government on behalf of households. Such expenditure provides for national defense, police and fire protection, public education, the judicial system, public health services, etc.

b. Assuming $Y^*_\dagger$ is in fact achieved, there will be some level of $\bar{G}$ which will be an optimal allocation of income to collective consumption and investment expenditure, given society's preferences, as expressed through the political system. Any more or less than that level of $\bar{G}$ will result in an imbalance between public and private expenditure according to those politically determined preferences.

c. Since society cares how its GNP is divided between public and private expenditures, policy makers must choose a fiscal policy which takes into account this objective. That is, policy makers must not only try to achieve a Y^* consistent with society's preferences regarding the choice between unemployment and inflation rate combinations, but they must also formulate a budget which is consistent with society's preferences regarding the allocation of total GNP between public and private expenditures.

d. Since the $\bar{G}$ which provides for an optimal allocation between public and private expenditures will not generally be the $\bar{G}$ which, with a balanced budget, will achieve $Y^*_\dagger$, it will usually not be possible to formulate a fiscal policy which will provide for all three of the following:

a. a Y^* equal to Y^*_t;

b. an optimal division of Y^* between public and private expenditure;

c. a balanced budget.

e. In order to achieve both a. and b. above it will usually be necessary to forego a balanced budget. Sometimes it will be necessary to have a budget deficit, and other times a budget surplus will be in order if both of those objectives are to be achieved through the use of fiscal policy.

f. The problem of choosing among alternative budgets to achieve conflicting objectives can be seen in terms of Figure 4.9 which shows the balanced budget line and the flatter Y^*_t line. If the government has a target level of G which achieves its goal with respect to the allocation between public and private expenditures, that goal can be represented by $\bar{G}_t$ in the diagram. If the government insists on $\bar{G}_t$, then it cannot achieve both a balanced budget and Y^*_t. The balanced budget with $\bar{G} = \bar{G}_t$ is given by L, while the budget which yields a $Y^* = Y^*_t$ is given by K. In order to have both Y^*_t and a balanced budget, the government must choose budget A. But this involves a $\bar{G} > \bar{G}_t$. Given the government's preferences, one of the three objectives must be sacrificed.

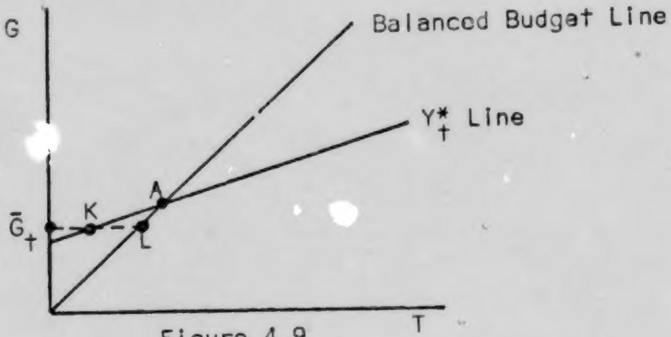

Figure 4.9

4.3.4. Do budget deficits cause inflation?

a. If policy makers choose to sacrifice the goal of budgetary balance in order to achieve its other objectives, what will be the consequences? The answer to this question may also provide insight into whether the desire for budgetary balance has any rational basis. It is not possible at this stage to answer this question fully. A more complete answer will come later in the course. At this point, however, a partial answer can be obtained by considering one argument against budgetary imbalance.

b. This argument is that a budget deficit will cause inflation. What is the validity of this argument in terms of the amended model? The model is determined by the levels of aggregate demand relative to potential GNP. Given the level of $\bar{G}$, the lower $\bar{T}$ is and, therefore, the larger the deficit is, the greater will be aggregate demand. Since more of all goods and services are demanded, prices will rise. Consequently, it is true that the larger the deficit, the greater will be the rate of inflation. It is in this sense that this argument has some truth.

c. However, given a Phillips Curve, there will be a preferred point on it which may involve a positive rate of inflation. To achieve that point may require a budget deficit, in which case an attempt to avoid the inflation by balancing the budget will result in less inflation and more unemployment than policy makers have determined to be consistent with the preferences of society on whose behalf they are acting. In other words, if the best feasible alternative involves a particular level of $\bar{G}$ and a particular positive rate of inflation, an attempt to avoid inflation (and thereby, select a less preferred alternative by reducing the budget deficit) would be inconsistent with the preferences of society with regard to alternative unemployment-inflation rate combinations.

d. Put somewhat differently, given a negatively-sloped Phillips Curve and given $\bar{G}$, a higher deficit (i.e., lower taxes) will yield a higher Y^* and, consequently, a higher rate of inflation and a lower rate of unemployment. It is not possible, given these assumptions, to reduce inflation by reducing the deficit without also increasing unemployment. To the extent that society cares about unemployment as well as inflation, policy makers are forced to consider the effects of the budget on both target variables, and they may find that a budget which generates some positive inflation preferable to one that generates zero inflation but higher unemployment.

e. In the foregoing discussion it should be understood that it is not the size of the deficit itself, but rather its effect on the level of Y^*, which determines the rate of inflation. Given the position of the Phillips Curve, the parameters a and b, and the level of $\bar{T}$, the following statements are true for the reasons given:

a. The same deficit with a higher level of $\bar{G}$ will cause more inflation. This is because a budget with the same deficit, but with higher $\bar{G}$, generates a higher Y^*.

b. There exists some balanced budget which will generate the same rate of inflation as any particular budget with a budget deficit. This is because there is always some balanced budget which will generate the same Y^* as another unbalanced budget.

4.4. Endogenous Taxes

4.4.1. The tax function

a. Thus far in the analysis it has been assumed that T was an exogenous variable determined by the government in formulating its fiscal policy. In reality, the government does not determine T directly. Rather it establishes and administers tax laws which state, among other things, the percent of sales, income, etc., households and businesses must pay in the form of taxes.

b. For the purpose of macroeconomic analysis, it is the aggregate of taxes, T, which is of interest. The income-expenditure model must be modified to take into account how T depends on the tax rates the government sets and on other variables in the model. That is, the model must include a tax function which gives total net taxes as a function of tax parameters, as determined by the tax laws, and other variables in the model.

c. Like the other relationships in the model, the tax function can at best be an approximation to the real world. The following equation, although very simple, provides a fairly accurate representation of how T actually behaves:

$$T = t_0 + t_1 Y.$$

It says that total net taxes are equal to a parameter, t_0, plus another parameter, t_1, times national income.

d. The parameter t_1 is the aggregate **marginal net tax rate**. It determines how total taxes minus total transfer payments change as GNP changes.

It captures the aggregate effects of existing tax rates on income and sales and existing transfer payment programs whose benefits are related to income. As the government changes tax and benefit rates, the parameter t_1 changes. Of course, an increase in tax rates or a decrease in benefit rates will increase t_1.

e. For the U. S. economy t_0 appears to be negative. Since T represents net taxes, i.e., taxes minus transfer payments, it is not surprising that $t_0 < 0$. As national income becomes smaller, i.e., as it approaches zero, taxes decline and transfer payments, such as unemployment compensation and welfare payments, increase, and if Y became low enough, net taxes would become negative. It is unlikely, however, that Y would ever fall low enough to make T negative. The parameter t_0 is the level of net taxes which theoretically would prevail if Y were zero. Any increase in taxes or decrease in benefits which is unrelated to Y will make t_0 larger, i.e., less negative. A changes in exemptions -- income which is exempt from taxes -- would change t_0. An increase in axemptions will make t_0 smaller, i.e., more negative.

Example: *Suppose that* t_0 *is -200 and* t_1 *is .25. This implies that the net tax rate on income is 25 percent. Table 4.1 shows net taxes (T) for different levels of national income (Y).*

Y	*T*
0	*-200*
200	*-150*
400	*-100*
600	*-50*
800	*0*
1000	*50*
1200	*100*
1400	*200*

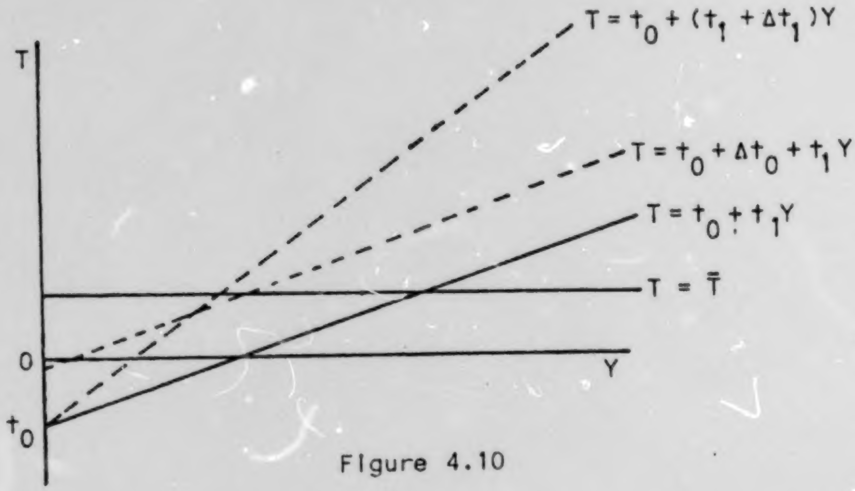

Figure 4.10

f. The tax function can be seen in diagrammatic terms in Figure 4.10. The vertical intercept corresponds to the parameter t_0. The slope of the tax function corresponds to the parameter t_1. An increase in t_1 would take the form of a counter-clockwise rotation in the tax function around the point of the vertical intercept. An increase in t_0 would appear as an upward parallel shift in the tax function. The horizontal line at $\bar{T}$ represents the tax function implicit in the assumption that T is exogenous.

4.4.2. Solving the model with endogenous T

a. The income-expenditure model for which the assumption that T is exogenous is replaced with a tax function like that presented in section 4.4.1 will have the following structural form:

(1) $C = a + bY_d$

(2a) $Y_d = Y - T$

(2b) $T = t_0 + t_1 Y$

(3) $E = C + \bar{I} + \bar{G}$

(4) $Y = E$

parameters: a, b, t_0, t_1
endogenous variables: C, E, Y, Y_d, T
exogenous variables: $\bar{I}, \bar{G}$

b. The reduced form equation for Y^* can be obtained by substituting T from equation (2b) for T in equation (2a), as follows:

$$Y_d = Y - t_0 - t_1 Y;$$

then substituting this expression for Y_d in equation (1), as follows:

$$C = a + b(Y - t_0 - t_1 Y);$$

then substituting this expression for C in equation (3), as follows:

$$E = a + b(Y - t_0 - t_1 Y) + \bar{I} + \bar{G};$$

then substituting this expression for E in equation (4) as follows:

$$Y = a + b(Y - t_0 - t_1Y) + \bar{I} + \bar{G};$$

and, finally, solving for Y in terms of only exogenous variables and parameters, as follows:

$$\text{(5a)} \qquad Y^* = \frac{a}{1-b(1-t_1)} - \frac{b}{1-b(1-t_1)}\,t_0 + \frac{1}{1-b(1-t_1)}\,\bar{I} + \frac{1}{1-b(1-t_1)}\,\bar{G}.$$

c. The new reduced form equation (5a) gives equilibrium GNP (Y^*) as a function of the consumption function parameters a and b, the tax parameters t_0 and t_1, and the exogenous variables $\bar{I}$ and $\bar{G}$. When an economy has an endogenous tax function, fiscal policy tools therefore include: (1) the level of government spending, $\bar{G}$; (2) the level of that portion of tax collections which is independent of the level of national income, t_0; and (3) the marginal net tax rate, t_1, which relates changes in total tax collections to changes in GNP.

d. An endogenous tax function affects the determination of equilibrium income in two important ways. First, a change in the tax parameter t_0 will cause a multiplied change in equilibrium GNP in much the same way that a change in $\bar{G}$ or $\bar{I}$ does, because a change in t_0 produces a change in Y_d, and therefore a change in C. Secondly, because the tax parameter appears in the coefficient of each term in the new reduced form equation for Y^* (5a), any change in t_1 will alter the degree to which a change in $\bar{G}$, $\bar{I}$, or t_0 changes Y^*. In other words, the **values of the multipliers** associated with changes in $\bar{G}$, $\bar{I}$, or t_0 depend upon t_1. Each of these points will now be examined in more detail.

e. Consider the effect of a change in the tax parameter t_0 on equilibrium GNP. The coefficient of t_0 in the reduced form equation is $-\frac{b}{1-b(1-t_1)}$, so an increase in t_0 will lead to a decrease in Y^*.

Example: *If* $b = .8$ *and* $t_1 = .25$, *then the multiplier for* t_0 *is* $-\frac{.8}{1 - .8(1 - .25)} = -\frac{.8}{.4} = -2$. *In this case, an increase in* t_0 *of 10 would lead to a decrease in* Y^* *of 20.*

f. It has been pointed out in section d above that the tax parameter t_1 appears in the reduced form coefficients of all of the exogenous variables in equation (5a). For that reason, whenever t_1 changes, so does the effect that a particular change in $\bar{G}$ or $\bar{I}$ or t_0 will have on Y^*. In other words, whenever t_1 changes, so do the values of all of the multipliers. Because t_1 appears in the denominator of the reduced form coefficients (i.e., multipliers), as t_1 gets larger the multipliers will get smaller, and conversely. That is, the stimulatory effect of an increase in spending on aggregate income and employment is less the larger the fraction of income increases collected as taxes. This is because with larger taxes, increments of spending are increasingly withdrawn from the income stream in the form of taxes.

g. The existence of a tax structure with a positive aggregate marginal net tax rate, as opposed to exogenous taxes with a zero marginal net tax rate, implies a smaller multiplier effect of autonomous changes in exogenous expenditure, such as a change in $\bar{I}$. That is, with such a tax structure a given change in $\bar{I}$ will produce a smaller change in Y^* than would be the case where T is exogenous. For this reason, the tax-transfer system provides the economy with a built-in stabilizer. In the absence of any conscious stabilizing action by the government, there will be an automatic partially offsetting change in net taxes in response to an autonomous change in expenditure which will reduce the size of the effect of an expenditure change on Y^*.

Example 1: *In what way does it make sense to say that the impact on equilibrium GNP of an increase in, say, investment spending should depend upon the form of the government's taxation function? Consider what* t_1 *actually represents. This "marginal net tax rate" shows what fraction of every additional dollar of GNP the government will withdraw from the spending stream in the form of tax collections. The concept of the multiplier depends upon the fact that an initial injection of spending makes several trips around the circular flow of goods and services in the economy. Each time additional money ends up in the pockets of a household, part of that additional income will itself become another addition to total spending. (Exactly what fraction of an income increase that gets re-spent depends upon the value of the marginal propensity to consume, b.) The parameter* t_1 *represents the rate at which the government* *siphons dollars out of the spending stream. The faster the government siphons money off (i.e., the larger is t_1), the smaller will be the ultimate or multiplied effect of an initial increase in some type of exogenous spending. This is true regardless of whether we are talking about the effectiveness of a change in $\overline{I}$, a change in $\overline{G}$, or a change in C caused by a change in t_0.*

Example 2: *Suppose two economies are initially at full employment with Y = 2000. Imagine that the two countries are identical in every respect except for their tax function. In country A, the tax function is:*

(A) $T = -200 + .20\,Y.$

In country B, the tax function is:

(B) $T = -400 + .30\,Y.$

Total net taxes are the same in the two countries: T = 200.

If b = .8 in the two countries, then the multipliers are

$$\frac{1}{1-(.8)(.8)} = 2.78 \text{ in A and } \frac{1}{1-(.8)(.7)} = 2.27 \text{ in B.}$$

If $\overline{I}$ dropped by 10, Y would fall by 27.8 in A, but only 22.7 in B. The difference, of course, is that the higher tax rate in B implies a more powerful built-in stabilizer.

h. From discussion of fiscal policy up to this point, one might obtain the impression that fiscal policy can be used to stablize the level of GNP only when policy makers take actions relating to G and T. This type of behavior is known as **discretionary** fiscal policy.

Definition: Discretionary fiscal policy -- Changes in $\bar{G}$, t_0, and/or t_1 made at the discretion, or free choice, of policy makers, as opposed to automatic changes in T which occur whenever Y^* changes.

However, when an economy has a taxation function which is related to levels of GNP, then the fiscal system also has inherent **automatic stabilizing** properties. Whether or not policy makers elect to implement discretionary fiscal policy, the fiscal system is automatically attentuating fluctuations in the level of GNP.

Example: *Why does the fact that tax collections are related to GNP mean that an economy has this built-in stabilizer? Because the amount of money which the government withdraws from the income stream is automatically adjusted as the level of GNP rises and falls. If a sudden surge in consumer spending drives Y* and prices upward, total tax collections, T, will automatically increase. This increase in withdrawals from the income stream will exert counter-cyclical downward pressure on Y* and prices. Alternatively, if anticipation of a future world crisis causes businesses to drastically decrease investment spending, tax collections automatically decrease as Y* begins to fall, thus helping to avert (or attentuate the magnitude of) a possible recession. In addition to making the values of the multipliers smaller, an endogenous tax function also acts as an important built-in stabilizer for the economy.*

4.4.3. Endogenous budget deficit

a. Because government sets its tax policy by determining tax rates, it does not directly control the level of total net taxes, T. As can be seen in terms of the aggregate tax function,

$$T = t_0 + t_1Y.$$

T* (the amount of actual tax revenues when the economy is in equilibrium) will depend on the tax parameters, which the government does control through the tax laws, and also on Y*, which in turn depends on other parameters in the model and the exogenous variables.

b. The reduced form equation for T* can be found by substituting for Y in the tax function the reduced form equation for Y*, as follows:

$$\begin{aligned} T^* &= t_0 + t_1Y^* \\ &= t_0 + t_1\left[\frac{a + bt_0 + \bar{G} + \bar{T}}{1 - b(1 - t_1)}\right] \\ &= t_0 + \frac{at_1 + bt_0t_1}{1 - b(1 - t_1)} + \frac{t_1}{1 - b(1 - t_1)}\,(\bar{T} + \bar{G}). \end{aligned}$$

In words, an autonomous increase in either $\bar{I}$ or $\bar{G}$ will lead to an increase in T^* equal to $\frac{t_1}{1-b(1-t_1)}$ times the increase in expenditure.

c. Once the government sets its tax policy, the value of T^* will depend on the values of the exogenous variables, e.g., $\bar{I}$. If $\bar{I}$ happened to be high, then Y^* and T^* will tend to be high. If $\bar{I}$ is low, then Y^* and T^* will tend to be low. This fact is a reflection of the tax structure's role as a built-in stabilizer. When $\bar{I}$ declines T is automatically reduced, which partially offsets the effect on Y^* of the decline in $\bar{I}$.

d. Since T is an endogenous variable, the budget deficit, $\bar{G} - T$, is also an endogenous variable. That is, the equilibrium value of the deficit, $\bar{G} - T^*$, will depend on the model's parameters and the exogenous variables just as T^* does. For a given $\bar{G}$, the lower Y^* and, consequently, T^*, the higher will be the budget deficit, $\bar{G} - T^*$. It is for this reason that the budget deficit tends to be large when the economy has high unemployment, i.e., when Y^* is low.

Example: *Consider the following data for the U.S. economy for the periods 1957-58, 1960-61, 1969-71, and 1973-75*

Year	*U*	*G-T*
1957	*4.3*	*-0.7*
1958	*6.8*	*12.5*
1960	*5.5*	*-3.7*
1961	*6.7*	*4.3*
1969	*3.5*	*-8.8*
1970	*4.9*	*10.1*
1971	*5.9*	*18.5*
1973	*4.9*	*-3.5*
1974	*5.6*	*11.5*
1975	*8.5*	*71.2*

In each of these periods unemployment rose as Y^* fell relative to Y_p. As a result taxes fell, transfer payments increased, and the budget shifted from a small surplus to a large deficit.

e. While the tax-transfer system serves as a built-in stabilizer, it can only partially offset the effect on Y^* of an autonomous change in an exogenous variable. Consequently, policy makers cannot rely on the automatic changes in net taxes to keep Y^* equal to Y^*_t. They must use **discretionary** changes in $\bar{G}$ and/or the tax parameters to keep Y^* on target.

4.4.4. Fiscal drag

As Y_f grows over time because of factors like population increases, changes in labor force participation, and technological advances, Y_t is also likely to grow. Under these circumstances it may be necessary to use discretionary fiscal policy to ensure that Y^* grows at the same rate as Y_t. This is because it would be most unusual for the growth in $\bar{I}$, the growth in $\bar{G}$ (in order to achieve the desired balance between public and private expenditures), and the growth in T^* (which occurs as Y^* grows) to all be in just the right amounts so as to make Y^* increase at the same rate as Y_t. When there is a difference in these growth rates, the government can use discretionary fiscal policy to adjust the growth rate of Y^* to be closer to the growth rate of Y_t.

b. The problem of keeping Y^* equal to a growing Y^*_t is accentuated by the form of the tax structure. Because t_0 is negative and t_1 is positive, as Y grows, the share of Y which the government receives in the form of net taxes will increase. That is, net taxes will grow at a faster rate than Y. This can be seen in Figure 4.11. For Y_0 the share of Y going to T is zero. For Y_1 it is positive. For higher levels, such as Y_2, the ratio of T to Y is even higher.

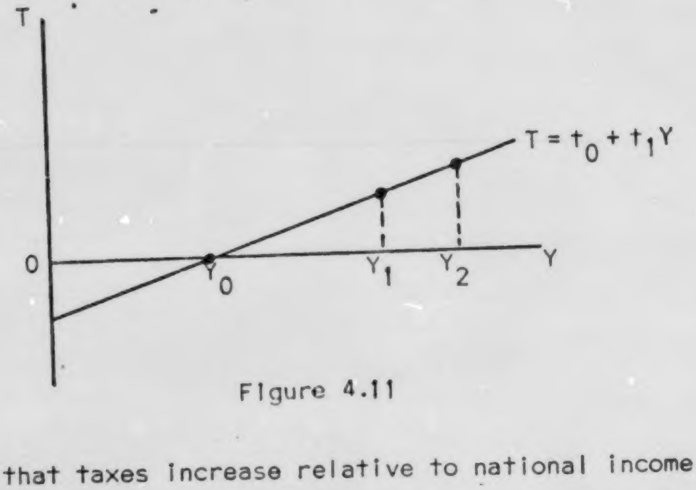

Figure 4.11

c. The fact that taxes increase relative to national income as national income increases means that the economy has a progressive tax structure.

This is a consequence of the widely accepted view, which is incorporated into U. S. tax laws, that people with high incomes should pay a larger share of their income in taxes because they are better able to afford it.

d. Because net taxes tend to increase relative to Y over time for given tax parameters, disposable income, $Y_d = Y - T$, will tend to decrease relative to Y. Consequently, consumption expenditure, which depends on disposable income, will tend to decrease relative to Y. That is, the tax structure will tend to keep one of the components of aggregate demand, and, therefore, aggregate demand itself, from keeping pace with the growth of Y_t. This tendency for the tax structure to keep Y* from growing as fast as Y_t is known as fiscal drag.

e. To counter the effect of fiscal drag will require policy makers to periodically reduce tax parameters. This will serve to shift the tax function down and keep taxes from continually rising relative to Y as Y increases.

4.4.5. The full-employment budget

a. Despite the stabilizing effect of the tax-transfer system, policy makers are still required to formulate discretionary fiscal policy if they wish to use fiscal policy to keep Y* equal to Y_t^*. Specifically, discretionary policy can be used to offset changes in exogenous variables and to keep Y* growing along with Y_t^* over time.

b. Evaluations of the performance of policy makers in using the budget to control Y* frequently use the budget deficit (or surplus) as a measure of the policy makers' actions. Earlier it was explained that failure to take account of the different between the $\bar{G}$ and $\bar{T}$ multipliers made such a use of the budget deficit misleading. The fact that T is an endogenous variable is another reason why using the budget deficit as an indicator of discretionary policy may be misleading. By simply looking at the change in the budget deficit from one year to the next, it is impossible to determine how much of the change is due to automatic tax and transfer changes and how much is due to discretionary changes in $\bar{G}$, t_0, and t_1.

c. The fact that tax revenues automatically fluctuate with changes in GNP suggests that there is a better way to evaluate policy makers' actions than by merely examining the actual current degree of balance in the government's budget. Instead of examining the current government budget to see if there is a surplus or deficit, one might instead evaluate what the government's deficit or surplus would be if equilibrium income (Y^*) were equal to full-employment income (Y_p). At Y_p, we could therefore estimate the 'full-employment budget' deficit or surplus. Since around 1950, an estimate of this magnitude has typically produced a surplus. Thus, most of the analysis which looks at the government's budget in this way uses the term **full-employment surplus (FES)**. While it is clearly possible to encounter a full employment deficit, this has been rare. In terms of terminology, therefore, we shall refer to the full employment surplus budget, realizing that a deficit situation would simply be represented as a negative value of the FES.

Definition: **Full-Employment Surplus** -- an estimate of the government's budget balance ($\bar{G} - T$) evaluated at full employment (Y_p) with a given t_0 and $\bar{G}$.

The FES is intended to measure the effect of discretionary fiscal policy on aggregate demand. An increase in the FES would indicate that discretionary policy is moving in the direction of reducing aggregate demand.

Because in recent times calculations have revealed an FES, discretionary policy has focused on attempts to reduce the size of the full-employment surplus. The Kennedy tax cut was one such example.

Example: *President Kennedy's reduction in the tax rate was justified to the Congress using both the terminology and the concept of the FES. While the Kennedy budget at current income levels would have yielded a deficit, it was noted that if the economy picked up, and income rose, with a given tax rate (t_0) there would be a budget surplus. This in its own right does not mean that full-employment could not be reached, since possibly increased aggregate demand in other sectors (I and C) would be sufficient to offset the dampening effects of* *the full-employment surplus. However, the President did not feel that fiscal policy was sufficiently stimulatory, given the FES, and thus he proposed and implemented a reduction in the tax rate, thereby reducing the estimate of the FES.*

d. There are two advantages of the FEB over the ordinary budget surplus or deficit as a measure of policy makers' actions. One advantage is that a change in the FEB reflects changes in $\bar{G}$, t_0, and t_1, but does not reflect changes in Y^* as does the ordinary budget surplus. That is, a change in the FEB will reflect discretionary fiscal policy actions but not automatic changes in T. This is because the FEB is the deficit or surplus that would result if Y were equal to Y_p, which is predetermined and therefore fixed in the short run, rather than Y^* which varies in the short run and will have an effect on the budget surplus. The only way the FEB can change in the short run is if $\bar{G}$, t_0 and/or t_1 change. Consequently, changes in the FEB will only reflect discretionary fiscal policy action.

Example: *In 1957-58 as the economy went into a recession the ordinary budget surplus fell sharply. The FES, however, increased. The latter indicated that discretionary policy was changing $\bar{G}$, t_0, and t_1 to make Y^* fall even more, thereby deepening the recession. The reason this did not appear evident when considering the ordinary surplus is that the fall in Y^* caused an automatic reduction in T which masked the inappropriate discretionary policy actions.*

e. The other advantage is that the FEB does reflect the effect of changes in Y_p on the hypothetical full-employment budget. In the absence of any change in $\bar{G}$, t_0, and t_1, the FEB would increase if Y_p increased. This measures the extent of fiscal drag, i.e., the increase in T generated by growth in the economy. Failure of policy makers to offset fiscal drag would, therefore, show up as an increase in the FEB surplus. In other words, the FEB serves to measure the effect of discretionary policy on aggregate demand relative to potential GNP.

3.2

Objective Question Bank for Macro Units 1 - 4

1 Two major events recently took place in the economy of Wupwup: 1) the level of total spending rose dramatically, and 2) trade unions received wage increases of 10% while labor productivity had increased 3%. Using Phillips Curve analysis, what should happen to the levels of inflation and unemployment in Wupwup?

1) The inflation rate should rise and the unemployment rate should fall.
2) The inflation rate should rise, but the effect on unemployment cannot be determined with the information given.
3) The unemployment rate should fall, but the effect on prices cannot be determined with the information given.
4) It is not possible to predict changes in either inflation rates or unemployment rates with the information given.

2 Which of the following is not a reasonable explanation of why the Phillips Curve for the U.S. economy has been shifting to the right over the past few years?

1) The growth rate of the labor force has been greater than the rate at which the economy has been able to create jobs for workers.
2) Spending done by the federal government for the Viet Nam War had large effects on prices but very little effect on employment.
3) There has been a general inflation of world prices involving many commodities which the U.S. imports.
4) People have come to fear and expect higher rates of future inflation. This is reflected in wage increases demanded by labor, in interest rates charged by banks, etc.

3 In an effort to make more housing available, the city of Washington, D.C. is investigating the elimination of rent controls. Which of the following is the most likely series of events if rent controls are eliminated?

1) An increase in rents followed by an increase in the housing quantity supplied.
2) An increase in demand followed by a decrease in the housing quantity supplied.
3) A decrease in rents followed by a decrease in the housing quantity supplied.
4) A decrease in demand followed by an increase in the housing quantity supplied.

4 During the first year that the Swine Flu vaccine became available, the quantity produced was too small to innoculate all those desiring the vaccination. Although the cost of production and the price were not particularly high, production could not be expanded rapidly enough to meet the demand. The government therefore helped allocate the available vaccine. What do these facts suggest about the price of the vaccine during the first year?

1) The price was at equilibrium.
2) The price was above equilibrium.
3) The price was below equilibrium.
4) There is not enough information to tell.

5 Evaluate this statement: "In advising governments about policy, it is the economist's role to set target variables for policy, thereby facilitating the identification of appropriate changes in instrument variables which will produce the targets."

1) Agree. Target-variable setting is outside the appropriate domain of the political process.
2) Agree. Target-variable setting is beyond the technical capacity of politicians untrained in formal economic analysis.
3) Disagree. Target-variable setting involves normative judgments beyond the professional domain of the economist.
4) Disagree. Target-variable setting involves selected elements of mathematical analysis which the economist is often ill-equipped to handle.

6 In advising the government on economic policy, the economist's role is:

1) to outline the consequences of alternative policies.
2) to reveal trade-offs amongst competing objectives as related to alternative policies.
3) both a and b.
4) neither a nor b.

7 The federal system of taxation acts as a built-in stabilizer because:

1) when GNP changes, Congress typically legislates changes in tax rates.
2) when GNP changes, the tax structure changes automatically.
3) tax collections tend to rise and fall as government spending rises and falls.
4) when GNP changes, tax receipts change automatically in the same direction without any change in rates.

8 Hisville's taxation function looks like this: T = 50 + .1Y .

Hersville's taxation function has this form: T = 250 .

Which of the following best describes the relationship between the taxation and spending multipliers within each country.

1) The taxation multiplier is one less than the spending multiplier in Hersville.
2) The difference between the taxation and spending multipliers in Hisville is less than one.
3) If government spending and taxes were simultaneously increased by 10 in each country, the resulting change in equilibrium GNP would be larger in Hersville.
4) All of the statements above are true.

9 A positive statement is

1) one that is true.
2) one that is probably true.
3) one that could conceivably be tested if we had sufficient data.
4) one that cannot be verified by appealing to facts.

10 Which of the following is a normative statement?

1) The Russians put a man on the moon before we did.
2) The Russians could have put a man on the moon before we did but chose not to.
3) Many Europeans would have preferred to see the Russians put a man to the moon before we did.
4) It would have been better for mankind if the Russians had put a man on the moon before we did.

11 If you feel that the government should conduct an active fiscal policy, but you also feel that the government sector is presently too large, then in the event of a recession you would argue that:

1) the government should not take any action.
2) the government should decrease taxes.
3) the government should increase transfer payments.
4) the government should increase spending for goods and services.

12 In a certain year the target level of aggregate demand is $280 billion. In the same year it is estimated that government expenditures will be $80 billion, taxes will be $60 billion, consumer expenditures will be $140 billion, private investment expenditures will be $80 billion, and saving will be $80 billion. To attain price stability under these conditions the government should:

1) encourage private investment spending by reducing corporate taxes.
2) increase government expenditures for goods and services.
3) discourage personal saving by reducing the interest rate.
4) increase personal income tax rates.

13 Which of the following programs would be most effective in reducing the amount of inflationary bias in the U.S. economy?

1) instituting a price freeze on goods whose prices rose faster than the average price level over the last five years
2) elimination of institutional factors which keep prices from falling in markets characterized by excess supply
3) negotiating new trade agreements with Arab countries in which we exchange technological advances for lower prices on their exported oil
4) declaring wage increases greater than corresponding increases in productivity to be illegal

14 Which of the following is the best explanation for the existence of an "inflationary bias" in the U.S. Economy?

1) Rising prices in markets with excess demand are not fully offset by falling prices in markets with excess supply.
2) Trade unions consistently demand and receive wage increases larger than corresponding increases in labor's productivity.
3) Rising prices of goods like oil which we must import make it impossible for the government to maintain price stability.
4) When forced to live with either inflation or unemployment, the majority of citizens prefer inflation.

The next seven questions are based upon this model of a simple economy:

$C = 100 + .75Y_d$

$I = 80$

$G = 120$

$T = 100$

$Y_d = Y - T$

$E = C + I + G$

$Y = E$

15 Identify the endogenous variables in this model:

1) C, Y, Y_d, E
2) I, G, T
3) Y, E
4) C, Y, T

(Based upon model)

16 Identify the exogenous variables in this model:

1) C, Y, Y_d, E
2) I, G, T
3) Y, E
4) C, I, G

(Based upon the model)

17 How many parameters are there in this model?

1) none
2) one
3) two
4) more than two

(Based upon the model)

18 Determine the equilibrium level of GNP:

1) 900
2) 1125
3) 1200
4) none of the above

(Based upon the model)

19 What is the value of the spending multiplier in this model?

1) 1.33
2) 3
3) 4
4) none of the above

(Based upon the model)

20 What is the value of the taxation multiplier in this model?

1) -1.33
2) -2
3) -4
4) none of the above

(Based upon the model)

21 How much consumption spending would be done in this economy if GNP were 1100?

1) 675
2) 775
3) 850
4) 925

The next two questions are based upon the following information:

22 The consumption function for Camelot is $C = 100 + .8Y_d$. The country is experiencing a rather severe recession, and policy makers are attempting to devise measures to increase equilibrium income and employment.

One government official suggests that an increase of \$4 million in government spending would increase equilibrium GNP by \$20 million. Do you agree?

1) Yes. If the MPC is .8, then the multiplier is 5.
2) Yes. In recessions, a government spending increase of \$1 would increase equilibrium GNP by at least \$5.
3) No. In times of recession the usual multiplier calculation is inappropriate.
4) No. Without knowing the form of the taxation function, it is not possible to estimate the value of the multiplier.

(Based upon previous question)

23 Studies have shown that residents of Camelot with incomes of less than \$10,000 per year spend a larger fraction of additions to their incomes than residents whose annual incomes are larger than \$10,000. It has therefore been suggested that a plan which increases taxes on incomes greater than \$10,000 and decreases taxes on lower incomes by exactly the same amount would increase consumption and aggregate income. Do you agree?

1) Yes. In addition, this will increase the economy's overall marginal propensity to consume and therefore increase the size of the multiplier.
2) Yes. Although the size of the multiplier remains unchanged, the amount of consumption spending and equilibrium income will increase.
3) No. In this plan the total amount of taxes collected does not change, so neither will equilibrium GNP.
4) No. This argument confuses changes in the distribution of income with changes in the level of aggregate income.

24 "The fact that tax revenues vary directly with national income means that the public budget can have a dampening effect on the economy as it grows, even though no discretionary fiscal action is taken."

1) This statement is incorrect for a market-oriented economy.
2) This statement illustrates the balanced-budget multiplier.
3) This statement applies only to economies with exogenous taxes.
4) This statement illustrates the idea of "fiscal drag."

25 Which of the following propositions is not true of a government that seeks to create full-employment in the face of a substantial deflationary gap?

1) The gap can be removed by either increasing government expenditure and holding taxes constant or by cutting taxes and holding expenditure constant.
2) The budget deficit required to remove the deflationary gap will be larger if it is accomplished by increasing expenditures than if it is accomplishe by cutting taxes.
3) It would be possible to develop a balanced-budget fiscal policy that would remove the deflationary gap, but this would result in a larger government sector than a policy which uses a deficit-spending budget.
4) It would be possible to remove the gap without incurring a budget deficit if there were policies available that could induce sufficient increases in private investment spending.

26 Congressman Ima Winner testified at a Congressional subcommittee that a major reason for the growth in the GNP gap is that the federal tax schedule has not been significantly changed in the last ten years. Ms. Winner stated that in a growing economy, tax parameters will have to be periodically decreased in order to promote full-employment. Do you agree?

1) Yes. Ms. Winner has described the phenomenon known as "fiscal drag."
2) Yes. Consumption spending is stimulated by the element of uncertainty, and changing tax schedules every two or three years will stimulate consumer spending.
3) No. Ms. Winner is overlooking the fact that a progressive tax structure acts as a built-in stabilizer for the economy.
4) No. If Congress continually reduces tax collections as GNP grows, the economy will soon be faced with runaway inflation.

27 According to the income-expenditures model,

1) the chief cause of unemployment is insufficient spending.
2) the equilibrium level of national income will tend to coincide with the full-employment level of income.
3) inflation and employment are indirectly or negatively related.
4) tax cuts or government spending cuts may be used to increase employment but tax cuts are more powerful.

28 Assume that an economy is presently operating at an "ideal" level in terms of the goals of price stability and employment. The government, however, wishes to undertake a $20 billion defense program without sacrificing any of its present programs. How can the government increase spending by $20 billion without disturbing the present levels of prices and employment?

1) Increase taxes by somewhat more than $20 billion, thereby offsetting the stimulatory effect of government spending.
2) Increase taxes by $20 billion, thereby achieving a balanced incremental budget which is neutral to employment and price levels.
3) Increase taxes by somewhat less than $20 billion, thereby engendering a countercyclical multiplier effect due to the displacement of private investment.
4) There is no feasible way in which government spending can be increased without changing the levels of prices and employment.

29 What can you conclude if the increase in nominal GNP is greater than the increase in real GNP during the same year?

1) Real GNP has increased while prices have risen.
2) Real GNP has increased while prices have fallen.
3) Nominal GNP has increased while prices have remained constant.
4) Nominal GNP has increased while prices have fallen.

30 Evaluate this statement: "As long as per capita money incomes are rising in the United States, so is the living standard of its citizens."

1) The statement is essentially correct.
2) The statement is true only when incomes are rising at the same rate as prices.
3) The statement fails to distinguish between real income and nominal income.
4) The statement is true during economic booms, but is incorrect in periods of recession.

31 Which of the following statements is incorrect?

1) The values of parameters in a model depend upon the values of the endogenous variables.
2) Endogenous variables are those whose values are determined within the model.
3) Exogenous variables influence the values of endogenous variables.
4) Identities are relationships that are true by definition.

32 In the relationship known as Okun's Law,

$$U = U_f + c \cdot \% \text{ GNP gap},$$

what does it mean to say that the "c" parameter has decreased in recent years?

1) A given decrease in the unemployment rate can now be achieved with a smaller increase in equilibrium GNP.
2) A given decrease in the unemployment rate can now be achieved only with a larger increase in equilibrium GNP.
3) Each percentage point of unemployment now costs the economy more in terms of foregone GNP.
4) Attempts to achieve full-employment through the use of fiscal policies will now be more difficult.

33 In the relationship known as Okun's Law,

$$U = U_f + c \cdot \% \text{ GNP gap},$$

what does it mean to say that the value of "c" is 1/3?

1) In order to decrease unemployment by one percentage point, GNP must be increased by 3%.
2) In order to decrease unemployment by three percentage points, GNP must be increased by 1%.
3) In order to decrease the GNP gap by 3%, the full-employment unemployment rate must be decreased by one percentage point.
4) In order to decrease the GNP gap by 3%, the full-employment unemployment rate must be increased by one percentage point.

34 Economy A has an exogenous tax structure with respect to income, while Economy B has an endogenous tax structure with respect to income. Both economies originally have balanced budgets. If chronic GNP gaps of equal size develop in each country, and if the respective governments decide to eliminate the gaps using balanced-budget fiscal policies, the size of the government sector:

1) would grow faster in the economy with the exogenous tax structure.
2) would grow faster in the economy with the endogenous tax structure.
3) would grow at the same rate in each country, given a balanced-budget framework.
4) no comparison can be made on the basis of the information given.

35 With reference to the problem outlined in the previous question, the amount of growth in the government sector would be most sensitive to:

1) the tax rate.
2) the shape of the Okun's Law relationship.
3) the form of government expenditures.
4) the shape of the Phillips Curve in the relevant range.

36 East Euphoria, a country with a progressive income tax, is faced with high unemployment. Their President has approved a program whereby total government spending next year will exceed this year's tax revenues by $60 million. Which of the following statements best describes the relationship between that fiscal program and the unemployment problem?

1) The excess of spending over tax revenues means that the government sector is stimulating employment.
2) While the government's program will increase employment, its effect on unemployment cannot be assessed without knowing the level of potential GNP.
3) In order to achieve full-employment, the government should implement a balanced budget.
4) Because tax revenues increase as equilibrium income increases, the government sector may or may not be promoting employment as the economy moves toward full-employment.

37 Which of the following economies would possess the largest fiscal drag?

1) One in which the citizens are taxed by a head tax on each member of the population.
2) One in which the citizens are taxed by property taxes.
3) One on which the citizens are taxed by a progressive income tax.
4) One in which the government collects no taxes.

38 The next two questions are based upon the following information:

At the present time, Upper and Lower Volta have identical consumption, investment, and government spending functions. The personal income taxation schedules for each country are given below:

Upper Volta	
Income level	Tax owed
0 - 1000	100
1001 - 2000	100
2001 - 3000	100
3001 - 4000	100

Lower Volta	
Income level	Tax owed
0 - 1000	100
1001 - 2000	110
2001 - 3000	120
3001 - 4000	130

Both countries have an unemployment rate of 7% and an inflation rate of 6%.

A proposal is made in the legislatures of each country to combat inflation with an $8 million decrease in government spending. In which country would this action be more successful in terms of lowering the inflation rate?

1) In Lower Volta.
2) In Upper Volta.
3) If government spending is decreased by the same amount in each country, the effect on inflation should be the same in each case.
4) Because of the simultaneous problem of unemployment, government spending decreases would not be effective in either country.

39 (Based upon chart that goes with previous question)

Economists have determined that if Upper Volta were to increase taxes by $10 million or decrease government spending by $8 million, the inflation rate would fall two percentage points and the unemployment rate would rise three percentage points. Based upon that information, some legislators now argue that neither action should be taken. What would you recommend to the legislature?

1) No action should be taken, because the increase in unemployment is greater than the decrease in inflation.
2) No action should be taken, because either action might worsen future trade-offs between inflation and unemployment.
3) Without knowing the equation for the Phillips Curve which this economy faces, there is not enough information to make a recommendation.
4) Without knowing society's relative preferences between inflation and unemployment, there is not enough information to make a recommendation.

4 Sample Games Materials

4.1 Games Description

A classroom game consists of an artificial environment in which the student plays an active role in the pursuit of some objective. For the games used in the course packages, the environment is an aggregative simulation model of an economy and the student's role is that of a policy-maker trying to avoid unemployment and inflation.

An appropriately structured game has several advantages over conventional methods for teaching aggregative economic theory and policy. Students are transformed from passive to active learners; they receive continuous feedback, and have the opportunity to apply repeatedly new ideas in a variety of contexts. This contrasts with notetaking - getting down the instructor's 'pearls of wisdom' - and passively reviewing textual materials. Since participation in a game both entices involvement (because it is fun) and requires involvement (because an active response must be made), a game situation can be expected to be relatively successful in capturing the student's attention. The response of students to teaching games bears this out. A classroom game additionally provides continuous feedback. The student learns in short order where his or her policy decisions achieve their objectives and receives immediate reinforcement in numerous and diverse concrete situations.

In the conventional classroom situation, most students do not acquire an adequate understanding of economic theory or how it relates to either economic policy or everyday economic events. In the game situation, the student is confronted by a set of data on economic variables, such as GNP, employment, etc., and is given the objective of changing these variables through economic policy. Students are forced to use economic theory both to order and make sense of this mass of information and to instruct them on how the policy tools at their command should be used. In this context, theory will be viewed as a useful tool for understanding economic events rather than as a set of mechanical rules for manipulating abstract relationships, all of which appear unrelated to the real world.

4.2 Program for Game 1

```
H E R I O T - W A T T   U N I V E R S I T Y
= = = = = =   = = = =   = = = = = = = = = =

FILE: ATTI3 /U329003            DATE:  THURSDAY, 01/09/77
      ====== =======                    TIME: 02:19 PM


  50 $TSSEDIT
 100 C**  USMCR1,
 200 C**  SETUP  **
 300 FILE  5=TTY,UNIT=REMOTE
 400       DIMENSION A1(2,2),A2(2,2),B1(2)
 500       REAL I,IO,M
 600       DATA N,I,G,T,A,M,W,W2/0,11.,15.5,15.,4.,.75,110.,110./
 700       WRITE(5,1)
 800 1     FORMAT(//,"WELCOME TO USMCR1.  WHAT IS YOUR NAME? " )
 900       READ(5,2)YOUR,NA,ME
1000 2     FORMAT(3A5)
1100       ASSIGN 4 TO K
1200       IF(YOUR.EQ."RESUM")GO TO 8020
1300       Y=(1/(1-M))*(A-M*T+I+G)
1400       Q=Y*1.01
1500       GO TO 400
1600 4     N=1
1700       WRITE(5,5)
1800 5     FORMAT(///,"YEAR=1")
1900       ASSIGN 6 TO K
2000       GO TO 8
2100 C**  QUARTERLY INSTRUCTIONS  **
2200 6     N=N+1
2300       Q2=Q*1.03
2400       G1=0
2500       T1=0
2600       A0=0
2700       IO=0
2800       WRITE(5,7)N,Q2
2900 7     FORMAT(///,"YEAR="I2,"  Q="F5.1)
3000 8     GO TO (10,20,30,40,50,60,70,80,90,100,110,120,130,140,
3100      *1150,160,170,180),N
3200 10    WRITE(5,15)
3300 15    FORMAT(" THE GOVERNMENT HAS DECIDED TO TRY TO ACHIEVE FULL"/
3400      * " EMPLOYMENT BY INCREASING G BY 3.1 (THE GAP BETWEEN Q AND Y)"/
3500      * " WHILE HOLDING T CONSTANT.  THIS POLICY RESULTS IN-")
3600       G1=3.1
3700       GO TO 400
```

```
3800 20     WRITE(5,25)
3900 25     FORMAT(" POLICY FOR YEAR 1 WAS, AS YOU CAN SEE, A DISASTER."/
4000       * " THE PRESIDENT AND CONGRESS HAVE AGREED TO FOLLOW THE ADVICE"/
4100       * " OF A COMPETENT ECONOMIC EXPERT (THAT,S YOU).  NEXT YEAR YOU"/
4200       * " WILL BE ABLE TO CHANGE G BUT T WILL REMAIN AT 15.  REMEMBER"/
4300       * " YOUR GOAL IS TO ACHIEVE FULL EMPLOYMENT, I.E. Y=Q.")
4400        J=-1
4500        GO TO 200
4600 30     WRITE(5,35)
4700 35     FORMAT(" AGAIN YOU WILL BE PERMITTED TO CHANGE G.")
4800        GO TO 200
4900 40     WRITE(5,45)
5000 45     FORMAT(" INVESTMENT IS EXPECTED TO DECREASE BY 2.  YOU WILL"/
5100       * " BE PERMITTED TO CHANGE G.")
5200        I0=-2
5300        GO TO 200
5400 50     WRITE(5,55)
5500 55     FORMAT(" INVESTMENT IS EXPECTED TO INCREASE BY 4.  YOU WILL BE"/
5600       * " AGAIN BE PERMITTED TO CHANGE G ONLY.")
5700        I0=4
5800        GO TO 200
5900 60     WRITE(5,65)
6000 65     FORMAT(" CONGRESSIONAL LEADERS, UPSET BY THE ON AGAIN, OFF"/
6100       * " AGAIN PATTERN OF FEDERAL SPENDING, HAVE ANNOUNCED THERE"/
6200       * " WILL BE NO CHANGE IN G FOR YEAR 6.  THEY WILL, HOWEVER,"/
6300       * " CONSIDER A CHANGE IN T.")
6400        J=0
6500        GO TO 200
6600 70     WRITE(5,75)
6700 75     FORMAT(" EXPANDED HEALTH CARE BENEFITS ARE EXPECTED TO"/
6800       *       " INCREASE G BY 4.  YOU MAY CHANGE T.")
6900        G1=4
7000        J=0
7100        GO TO 200
7200 80     WRITE(5,85)
7300 85     FORMAT(" CONGRESS APPROVES THE B1 BOMBER.  G WILL INCREASE"/
7400       * " BY 1.5.  AGAIN YOU MAY CHANGE T.")
7500        G1=1.5
7600        GO TO 200
7700 90     WRITE(5,95)
7800 95     FORMAT(" ENVIRONMENTALISTS PUSH THROUGH A SPECIAL TAX ON"/
7900       * " AUTOMOBILE HORSEPOWER.  T WILL INCREASE BY 3; YOU MAY"/
8000       * " CHANGE G.")
8100        J=-1
8200        T1=3
```

```
        GO TO 200
100     WRITE(5,105)
105     FORMAT(" IT WILL NOW BE POSSIBLE TO CHANGE BOTH G AND T."/
       * " THERE IS CONSIDERABLE SENTIMENT FOR POLICIES WHICH WILL"/
       * " NOT INCREASE THE SIZE OF THE DEFICIT.")
        J=1
        GO TO 200
110     WRITE(5,115)
115     FORMAT(" A HOUSING BOOM IS EXPECTED TO RAISE I BY 3."/
       * " AGAIN YOU MAY CHANGE BOTH G AND T.")
        I0=3
        GO TO 200
120     WRITE(5,125)
125     FORMAT(" A SHIFT IN THE SAVING FUNCTION IS PREDICTED OF -2."/
       * " YOU MAY CHANGE BOTH G AND T."/
       * " WHAT IS YOUR PREDICTION FOR THE CHANGE IN CONSUMPTION IF Y"/
       * " AND T ARE UNCHANGED? " )
        A0=2
        R2=2
        ASSIGN 127 TO K
        GO TO 800
127     ASSIGN 6 TO K
        GO TO 200
130     WRITE(5,135)
135     FORMAT(" A SHIFT IN THE SAVING FUNCTION OF +1 IS EXPECTED."/
       * " YOU WILL BE PERMITTED TO CHANGE BOTH G AND T."/
       * " WHAT IS YOUR PREDICTION FOR THE CHANGE IN CONSUMPTION IF G"/
       * " AND T ARE UNCHANGED? " )
        A0=-1
        R2=(-1)*(1/(1-M))
        ASSIGN 137 TO K
        GO TO 800
137     ASSIGN 6 TO K
        GO TO 200
140     WRITE(5,145)
145     FORMAT(" CONGRESSIONAL CONSERVATIVES HAVE PERSUADED THE"/
       * " PRESIDENT OF THE NECESSITY FOR A BALANCED BUDGET AS A"/
       * " CONDITION FOR SUPPORT OF HIS NEW PROGRAMS.  CONSEQUENTLY,"/
       * " YOU SHOULD AIM FOR FULL EMPLOYMENT WITH A BALANCED BUDGET."/
       * " YOU WILL BE PERMITTED TO CHANGE BOTH G AND T.  YOUR LOSS OF"/
       * " SCORE THIS PERIOD WILL BE-"/8X,"(G-T)**2+(Y-Q)**2   (**2="
       *"SQUARED)")
        J=1
        WGT=1
        GO TO 200
150     WRITE(5,155)
```

```
12900 155   FORMAT(" THE BALANCED BUDGET POLICY WILL BE CONTINUED."/
13000      * " YOU WILL BE PERMITTED TO CHANGE BOTH G AND T.  YOUR LOSS OF"/
13100      * " SCORE WILL AGAIN BE-"/8X,"(G-T)**2 + (Y-Q)**2")
13200       WGT=1
13300       GO TO 200
13400 160   C2=C+3
13500       WRITE(5,165)C2,C2
13600 165   FORMAT(" THE GOVERNMENT IS UNDER PRESSURE FROM LABOR GROUPS"/
13700      * " AND SENIOR CITIZENS TO INCREASE CONSUMPTION,S SHARE OF Y."/
13800      * " YOUR TARGET IS TO INCREASE C BY 3 TO"F5.1,".  IN ADDITION,"/
13900      * "OF COURSE, YOU SHOULD AIM FOR A FULL EMPLOYMENT GNP."/
14000      * "SQUARED DEVIATIONS OF C FROM THIS TARGET WILL BE DEDUCTED"/
14100      * " FROM YOUR SCORE.  YOU WILL BE PERMITTED TO CHANGE BOTH"/
14200      * " G AND T.  YOUR LOSS WILL BE-"/
14300      *8X,"(C**"F5.1,")**2 + (Y-Q)**2")
14400       C1=(C+3)/(Q*1.03)
14500       WGT=0
14600       WC=1
14700       GO TO 200
14800 170   C2=C1*Q*1.03
14900       WRITE(5,175)C1,C2,C2
15000 175   FORMAT(" YOUR GOAL IS TO MAINTAIN THE CONSUMPTION SHARE"
15100      *  "TARGETED"/" FOR LAST YEAR, I.E."F5.2,".  THUS C SHOULD BE"F5.1
15200      * ,".  YOU"/" SHOULD AIM FOR FULL EMPLOYMENT AS WELL.  AGAIN YOU"
15300      *  "WILL BE"/" PERMITTED TO CHANGE BOTH G AND T, AND YOUR LOSS"
15400      * " WILL BE-"/8X,"(C-"F5.1,")**2 + (Y-Q)**2")
15500       WC=1
15600       GO TO 200
15700 180   C2=C1*Q*1.03
15800       WRITE(5,185)C2
15900 185   FORMAT(" AGAIN YOU SHOULD MAINTAIN THE CONSUMPTION SHARE TARGET"
16000      *"."/" IN ADDITION THE PRESIDENT WANTS A BALANCED BUDGET AND"/
16100      *" FULL EMPLOYMENT.  YOU WILL BE PERMITTED TO CHANGE BOTH"/
16200      * " G AND T.  YOUR LOSS WILL BE-"/8X,"(C-"F5.1,")**2 + (G-T)**2"
16300      * " + (Y-Q)**2"/" GOOD LUCK.")
16400       WGT=1
16500       WC=1
16600       GO TO 200
16700 C**  POLICY INPUT  **
16800 200   IF(J)210,230,250
16900 210   WRITE(5,215)T1
17000 215   FORMAT(" TCHANGE="F5.1/" GCHANGE=  " )
17100       READ(5,/)G1
17200       GO TO 290
17300 230   WRITE(5,235)G1
17400 235   FORMAT(" GCHANGE="F5.1/" TCHANGE=  " )
17500       READ(5,/)T1
```

```
      GO TO 290
250   WRITE(5,255)
255   FORMAT(" GCHANGE=  " )
      READ(5,/)G1
      WRITE(5,275)
275   FORMAT(" TCHANGE=  " )
      READ(5,/)T1
      GO TO 290
290   IF(G1-99)300,8000,300
300   IF(T1-99)310,8000,310
310   IF(G+G1)320,330,330
320   WRITE(5,325)
325   FORMAT(" G CANNOT BE NEGATIVE.  CHECK YOUR WORK AND REENTER."
      GO TO 200
330   WRITE(5,335)
335   FORMAT(" CORRECTIONS (YES OR NO) " )
      READ(5,345)R1
345   FORMAT(A3)
      IF(R1.EQ."YES")GO TO 200
C**  QUARTERLY RUN  **
400    T=T+T1
       G=G+G1
       A=A+A0
       I=I+I0
       Q=Q*1.03
       Y=(1/(1-M))*(A-M*T+I+G)
       D=Y-T
       C=A+M*D
       GT=G-T
       GO TO 500
C**  POLICE POLICY AND COMPUTE SCORE  **
500    SO=ABS(Y-Q)**2
       IF(N-1)700,590,510
510    IF(WGT)9999,530,520
520    SO=SO+ABS(G-T)**2
530    IF(WC)9999,550,540
540    SO=SO+ABS(C-C2)**2
550    IF(SO-5)610,610,560
560    IF(J1)9999,570,590
570    T=T-T1
       G=G-G1
       A=A-A0
       I=I-I0
       Q=Q/1.03
       WRITE(5,585)
585    FORMAT(" YOUR POLICY WOULD RESULT IN A LARGE LOSS."/
      * " CHECK YOUR WORK AND RESUBMIT.")
       J1=1
      GO TO 200
590   IF(S0-10)610,610,600
600   S0=10
610   W=W2-S0
      W2=W
      J1=0
      GO TO 700
C**  PRINT GNP ACCOUNTS  **
700   WRITE(5,705)YOUR,NA,ME,N,Q,Y,C,I,G,T,GT,D,W,S0
705   FORMAT(/1H ,3A5,6X,"GNP ACCOUNTS  YEAR "I2/" Q="F5.1,5X,"Y="F5.
     *1,5X,"C="F5.1,5X,"I="F5.1,5X,"G="F5.1/" T="F5.1,3X,"G-T="F5.1,
     *5X,"D="F5.1," SCORE="F5.1,"  LOSS="F6.2)
      IF(N)9999,4,1000
C**  ANSWERS TO QUESTIONS  **
800   J2=0
810   READ(5,/)R1
      IF(INT(ABS(50*(R2-R1)/R2)))9999,820,830
820   WRITE(5,825)
825   FORMAT(" VERY GOOD.")
      GO TO K,(4,6,127,137)
830   IF(J2)9999,840,850
840   WRITE(5,845)
845   FORMAT(" SURELY YOU CAN DO BETTER,  TRY AGAIN. " )
      J2=1
      GO TO 810
850   WRITE(5,855)R2
855   FORMAT(" SORRY, THE CORRECT ANSWER IS"F5.2,".")
      GO TO K,(4,6,127,137)
C**  QUARTERLY QUESTIONS  **
1000  GO TO(1010,1020,1030,1040,1050,1060,1070,1080,1090,1100,
     *1110,1120,1130,1140,1150,1160,1170,1180),N
1010  WRITE(5,1015)
1015  FORMAT(//"WHAT IS YOUR ESTIMATE OF THE ANNUAL GROWTH RATE"
     *" OF Q (%)? " )
      READ(5,/)R1
      WRITE(5,1017)
1017  FORMAT(" THE GROWTH RATE IS 3%/YR; TO SAVE COMPUTATION, IN THE"
     * " FUTURE AN ESTIMATE OF Q WILL BE PROVIDED PRIOR TO REQUESTS"/
     * " FOR POLICY.")
      GO TO 6
1020  WRITE(5,1025)
1025  FORMAT(//"WHAT IS THE GOVERNMENT EXPENDITURES MULTIPLIER? " )
      R2=1/(1-M)
      GO TO 800
1030  GO TO 6
1040  WRITE(5,1045)
```

```
1045  FORMAT(//"WHAT IS THE INVESTMENT MULTIPLIER? " )
      R2=1/(1-M)
      GO TO 800
1050  WRITE(5,1055)
1055  FORMAT(//"WHAT IS YOUR ESTIMATE OF THE MARGINAL PROPENSITY"
     *" TO CONSUME? " )
      R2=M
      GO TO 800
1060  WRITE(5,1065)
1065  FORMAT(//"WHAT IS THE TAX MULTIPLIER?  (ALTHOUGH AN INCREASE"/
     * " IN TAXES CAUSES A DECREASE IN GNP AND VICE VERSA, THE"/
     * " CONVENTION IS TO REPORT THE TAX MULTIPLIER AS A POSITIVE"/
     * " NUMBER). " )
      R2=M/(1-M)
      GO TO 800
1070  GO TO 6
1080  GO TO 6
1090  WRITE(5,1095)
1095  FORMAT(//"WHAT IS YOUR ESTIMATE OF THE BALANCED BUDGET"/
     * " MULTIPLIER (THE EFFECT OF INCREASING G AND T BY EQUAL"/
     * " AMOUNTS)? " )
      R2=1
      GO TO 800
1100  GO TO 6
1110  GO TO 6
1120  GO TO 6
1130  GO TO 6
1140  GO TO 6
1150  GO TO 6
1160  GO TO 6
1170  GO TO 6
1180  WRITE(5,1185)
1185  FORMAT(//"EXPERTS FROM THE BROOKINGS INSTITUTION, A WASHINGTON"/
     * " THINK TANK ON ECONOMIC POLICY, HAVE POINTED OUT IN A LETTER"/
     * " TO THE WALL STREET JOURNAL THAT SIMULTANEOUS ACHIEVEMENT OF"/
     * " THESE OBJECTIVES IS UNLIKELY.")
      S1=ABS(C-C2)**2+ABS(Y-O)**2+ABS(G-T)**2
      E0=(1-M)*(1-M)
      E1=M*M/E0
      A1(1,1)=E1+1/E0+1
      A1(2,1)=E1+M/E0+1
      A1(1,2)=-A1(2,1)
      A1(2,2)=-2*E1-1
      F2=(I+A)/(1-M)
      B1(1)=-(A+M*F2-C2)*M/(1-M)
      B1(2)=B1(1)
      B1(1)=B1(1)-(E2-Q)/(1-M)
      B1(2)=B1(2)-(E2-Q)/(1-M)*M
      A1DET=A1(1,1)*A1(2,2)-A1(2,1)*A1(1,2)
      A2(1,1)=A1(2,2)/A1DET
      A2(2,1)=-A1(2,1)/A1DET
      A2(1,2)=-A1(1,2)/A1DET
      A2(2,2)=A1(1,1)/A1DET
      G=A2(1,1)*B1(1)+A2(1,2)*B1(2)
      T=A2(2,1)*B1(1)+A2(2,2)*B1(2)
      Y=(1/(1-M))*(A-M*T+I+G)
      C=A+M*(Y-T)
      S2=ABS(C-C2)**2+ABS(Y-C)**2+ABS(G-T)**2
      GT=G-T
      WRITE(5,1187)S1,G,T,C,Y,GT,S2
1187  FORMAT(" THE LOSS ASSOCIATED WITH YOUR POLICY IS"F5.1,"."/
     * " OPTIMAL POLICY OBTAINED BY TAKING A FEW DERIVATIVES,"/
     * " IS A G OF"F5.1," AND A T OF"F5.1,".  THIS POLICY WOULD"
     * " HAVE PRODUCED THE FOLLOWING RESULTS-"/
     * " C="F5.1,"  Y="F5.1,"  G-T="F5.1,"  LOSS="F5.1)
      GO TO 9000
C**   INTERRUPT PLAY  **
8000  N1=N-1
      C2=C2/1.03
      WRITE(5,8015)N1,N1,Q,I,G,T,D,C,C2,W2,J,YOUR,NA,ME
8015  FORMAT(//,"YOU HAVE INTERRUPTED PLAY AFTER YEAR "I2,"."/
     * " TO RESUME PLAY FOLLOW  INSTRUCTIONS FOR USMCR1 ."/
     * " WHEN ASKED,  WHAT IS YOUR NAME?  ANSWER  RESUME ."/
     * " THEN TYPE THE  RESUME DATA  WHICH FOLLOWS-"/1H ,
     * I2,","8(F5.1,","),I2,","3A5)
      GO TO 9999
C**   RESUME BRANCH  **
8020  WRITE(5,8025)
8025  FORMAT(1H ,"TYPE  RESUME DATA  LINE."/
     * " ALL SPACES AND COMMAS ARE ESSENTIAL.")
      READ(5,9995)N,Q,I,G,T,D,C,C2,W2,J,YOUR,NA,ME
 9995  FORMAT(1X,I2,1X,8(F5.1,1X),I2,1X,3A5)
      A=C-M*D
      C1=C2/Q
      GO TO 6
C**   END MESSAGE  **
9000  WRITE(5,9005)W
9005  FORMAT(//,"THIS ENDS USMCR1.  YOUR FINAL SCORE IS"F5.1,"."
     * " YOU SHOULD NOW TYPE  K/F  TO LOGOUT.")
9999  STOP
      END
```

4.3 Run of Game 1

```
WELCOME TO USMCR1.  WHAT IS YOUR NAME?
?DICK←

 DICK                       GNP ACCOUNTS  YEAR  0
 O= 80.1      Y= 77.0      C= 50.5      I= 11.0      G= 15.5
 T= 15.0   G-T=  0.5      D= 62.0 SCORE=110.0  LOSS=  9.63


YEAR=1
 THE GOVERNMENT HAS DECIDED TO TRY TO ACHIEVE FULL
 EMPLOYMENT BY INCREASING G BY 3.1 (THE GAP BETWEEN O AND Y)
 WHILE HOLDING T CONSTANT.  THIS POLICY RESULTS IN-

 DICK                       GNP ACCOUNTS  YEAR  1
 O= 82.5      Y= 89.4      C= 59.8      I= 11.0      G= 18.6
 T= 15.0   G-T=  3.6      D= 74.4 SCORE=100.0  LOSS= 10.00

WHAT IS YOUR ESTIMATE OF THE ANNUAL GROWTH RATE OF O (%)?
?4.0←
 THE GROWTH RATE IS 3%/YR; TO SAVE COMPUTATION, IN THE
 FUTURE AN ESTIMATE OF O WILL BE PROVIDED PRIOR TO REQUESTS
 FOR POLICY.
```

```
YEAR= 2  Q= 85.0
 POLICY FOR YEAR 1 WAS. AS YOU CAN SEE. A DISASTER.
 THE PRESIDENT AND CONGRESS HAVE AGREED TO FOLLOW THE ADVICE
 OF A COMPETENT ECONOMIC EXPERT (THAT.S YOU).  NEXT YEAR YOU
 WILL BE ABLE TO CHANGE G BUT T WILL REMAIN AT 15.  REMEMBER
 YOUR GOAL IS TO ACHIEVE FULL EMPLOYMENT. I.E. Y=Q.
 TCHANGE=  0.0
 GCHANGE=
?-3.0←
 CORRECTIONS (YES OR NO)
?NO←
 YOUR POLICY WOULD RESULT IN A LARGE LOSS.
 CHECK YOUR WORK AND RESUBMIT.
 TCHANGE=  0.0
 GCHANGE=
?-3.0←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                     GNP ACCOUNTS  YEAR  2
 Q= 85.0      Y= 77.4      C= 50.8      I= 11.0      G= 15.6
 T= 15.0   G-T=  0.6      D= 62.4 SCORE= 90.0  LOSS= 10.00


WHAT IS THE GOVERNMENT EXPENDITURES MULTIPLIER?
?2.0←
 SURELY YOU CAN DO BETTER.  TRY AGAIN.
?3.0←
 SORRY. THE CORRECT ANSWER IS 4.00.



YEAR= 3  Q= 87.5
 AGAIN YOU WILL BE PERMITTED TO CHANGE G.
 TCHANGE=  0.0
 GCHANGE=
?2.53←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                     GNP ACCOUNTS  YEAR  3
 Q= 87.5      Y= 85.4      C= 56.8      I= 11.0      G= 17.6
 T= 15.0   G-T=  2.6      D= 70.4 SCORE= 95.5  LOSS=  4.54
```

```
YEAR= 4  O= 90.2
 INVESTMENT IS EXPECTED TO DECREASE BY 2.  YOU WILL
 BE PERMITTED TO CHANGE G.
  TCHANGE=  0.0
  GCHANGE=
?-3.2←
 CORRECTIONS (YES OR NO)
?YES←
  TCHANGE=  0.0
  GCHANGE=
?3.2←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                     GNP ACCOUNTS  YEAR  4
 O= 90.2      Y= 90.2     C= 60.4     I=  9.0      G= 20.8
 T= 15.0   G-T=  5.8      D= 75.2 SCORE= 85.5  LOSS=  0.00


WHAT IS THE INVESTMENT MULTIPLIER?
?4.0←
 VERY GOOD.
```

```
YEAR= 5  Q= 92.9
 INVESTMENT IS EXPECTED TO INCREASE BY 4.  YOU WILL BE
 AGAIN BE PERMITTED TO CHANGE G ONLY.
 TCHANGE=  0.0
 GCHANGE=
?-2.68←
 CORRECTIONS (YES OR NO)
?NO←
 YOUR POLICY WOULD RESULT IN A LARGE LOSS.
 CHECK YOUR WORK AND RESUBMIT.
 TCHANGE=  0.0
 GCHANGE=
?-1.33←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                    GNP ACCOUNTS  YEAR  5
 Q= 92.9     Y=100.9     C= 68.4     I= 13.0     G= 19.5
 T= 15.0   G-T=  4.5     D= 85.9 SCORE= 75.5  LOSS= 10.00


WHAT IS YOUR ESTIMATE OF THE MARGINAL PROPENSITY TO CONSUME?
?.75←
 VERY GOOD.
```

```
YEAR= 6  Q= 95.6
 CONGRESSIONAL LEADERS, UPSET BY THE ON AGAIN, OFF
 AGAIN PATTERN OF FEDERAL SPENDING, HAVE ANNOUNCED THERE
 WILL BE NO CHANGE IN G FOR YEAR 6.  THEY WILL, HOWEVER,
 CONSIDER A CHANGE IN T.
 GCHANGE=  0.0
 TCHANGE=
?1.33←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                    GNP ACCOUNTS  YEAR  6
 Q= 95.6      Y= 96.9      C= 64.4      I= 13.0      G= 19.5
 T= 16.3    G-T=  3.1      D= 80.6 SCORE= 73.9  LOSS=  1.54


WHAT IS THE TAX MULTIPLIER?  (ALTHOUGH AN INCREASE
 IN TAXES CAUSES A DECREASE IN GNP AND VICE VERSA, THE
 CONVENTION IS TO REPORT THE TAX MULTIPLIER AS A POSITIVE
 NUMBER).
?4.0←
 SURELY YOU CAN DO BETTER.  TRY AGAIN.
?3.0←
 VERY GOOD.



YEAR= 7  Q= 98.5
 EXPANDED HEALTH CARE BENEFITS ARE EXPECTED TO
 INCREASE G BY 4.  YOU MAY CHANGE T.
 GCHANGE=  4.0
 TCHANGE=
?4.8←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                    GNP ACCOUNTS  YEAR  7
 Q= 98.5      Y= 98.5      C= 62.0      I= 13.0      G= 23.5
 T= 21.1    G-T=  2.3      D= 77.4 SCORE= 73.9  LOSS=  0.00
```

```
YEAR= 8  Q=101.5
 CONGRESS APPROVES THE B1 BOMBER.  G WILL INCREASE
 BY 1.5.  AGAIN YOU MAY CHANGE T.
 GCHANGE=  1.5
 TCHANGE=
?1.OIDEL
1.0←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                        GNP ACCOUNTS  YEAR  8
 Q=101.5       Y=101.5      C= 63.5      I= 13.0       G= 25.0
 T= 22.1    G-T=  2.8       D= 79.4 SCORE= 73.9  LOSS=  0.00


YEAR= 9  Q=104.5
 ENVIRONMENTALISTS PUSH THROUGH A SPECIAL TAX ON
 AUTOMOBILE HORSEPOWER.  T WILL INCREASE BY 3; YOU MAY
 CHANGE G.
 TCHANGE=  3.0
 GCHANGE=
?3.0←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                        GNP ACCOUNTS  YEAR  9
 Q=104.5       Y=104.5      C= 63.5      I= 13.0       G= 28.0
 T= 25.1    G-T=  2.8       D= 79.4 SCORE= 73.9  LOSS=  0.00


WHAT IS YOUR ESTIMATE OF THE BALANCED BUDGET
 MULTIPLIER (THE EFFECT OF INCREASING G AND T BY EQUAL
 AMOUNTS)?
?1.0←
 VERY GOOD.
```

```
YEAR=10  Q=107.7
 IT WILL NOW BE POSSIBLE TO CHANGE BOTH G AND T.
 THERE IS CONSIDERABLE SENTIMENT FOR POLICIES WHICH WILL
 NOT INCREASE THE SIZE OF THE DEFICIT.
 GCHANGE=
?99.0←
 TCHANGE=
?99.0←


YOU HAVE INTERRUPTED PLAY AFTER YEAR  9.
 TO RESUME PLAY FOLLOW  INSTRUCTIONS FOR USMCR1 .
 WHEN ASKED,  WHAT IS YOUR NAME?  ANSWER  RESUME .
 THEN TYPE THE  RESUME DATA  WHICH FOLLOWS-
  9,104.5, 13.0, 28.0, 25.1, 79.4, 63.5,  0.0, 73.9, 1,DICK


 END ATTI3 6.3 SEC.

E ATTI3/U329003←
 RUNNING



WELCOME TO USMCR1.  WHAT IS YOUR NAME?
?RESUME←
 TYPE  RESUME DATA  LINE.
 ALL SPACES AND COMMAS ARE ESSENTIAL.
?  9,104.5, 13.0, 28.0, 25.1, 79.4, 63.5,  0.0, 73.9, 1,DICK←


YEAR=10  Q=107.6
 IT WILL NOW BE POSSIBLE TO CHANGE BOTH G AND T.
 THERE IS CONSIDERABLE SENTIMENT FOR POLICIES WHICH WILL
 NOT INCREASE THE SIZE OF THE DEFICIT.
 GCHANGE=
?3.1←
 TCHANGE=
?3.1←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                     GNP ACCOUNTS  YEAR 10
 Q=107.6      Y=107.6      C= 63.5      I= 13.0      G= 31.1
 T= 28.2    G-T=  2.9      D= 79.4 SCORE= 73.9  LOSS=  0.00
```

```
YEAR=11  0=110.9
 A HOUSING BOOM IS EXPECTED TO RAISE I BY 3.
 AGAIN YOU MAY CHANGE BOTH G AND T.
 GCHANGE=
?-2.2←
 TCHANGE=
?0←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                    GNP ACCOUNTS  YEAR 11
 0=110.9      Y=110.8      C= 65.9       I= 16.0      G= 28.9
 T= 28.2   G-T=  0.7       D= 82.6 SCORE= 73.9  LOSS=  0.00


YEAR=12  0=114.2
 A SHIFT IN THE SAVING FUNCTION IS PREDICTED OF -2.
 YOU MAY CHANGE BOTH G AND T.
 WHAT IS YOUR PREDICTION FOR THE CHANGE IN CONSUMPTION IF Y
 AND T ARE UNCHANGED?
?-6.0←
 SURELY YOU CAN DO BETTER.  TRY AGAIN.
?-8.0←
 SORRY, THE CORRECT ANSWER IS 2.00.
 GCHANGE=
?2.9←
 TCHANGE=
?0←
 CORRECTIONS (YES OR NO)
?NO←
 YOUR POLICY WOULD RESULT IN A LARGE LOSS.
 CHECK YOUR WORK AND RESUBMIT.
 GCHANGE=
?-1.15←
 TCHANGE=
?NIDEL
0←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                    GNP ACCOUNTS  YEAR 12
 0=114.2      Y=114.2      C= 70.4       I= 16.0      G= 27.8
 T= 28.2   G-T= -0.4       D= 86.0 SCORE= 73.9  LOSS=  0.00
```

```
YEAR=13  O=117.6
 A SHIFT IN THE SAVING FUNCTION OF +1 IS EXPECTED.
 YOU WILL BE PERMITTED TO CHANGE BOTH G AND T.
 WHAT IS YOUR PREDICTION FOR THE CHANGE IN CONSUMPTION IF G
 AND T ARE UNCHANGED?
?-4.0←
 VERY GOOD.
 GCHANGE=
?.15←
 TCHANGE=
?0←
 CORRECTIONS (YES OR NO)
?NO←
 YOUR POLICY WOULD RESULT IN A LARGE LOSS.
 CHECK YOUR WORK AND RESUBMIT.
 GCHANGE=
?1.85←
 TCHANGE=
?0←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                      GNP ACCOUNTS  YEAR 13
 O=117.6     Y=117.6     C= 72.0      I= 16.0      G= 29.6
 T= 28.2   G-T=  1.4     D= 89.4 SCORE= 73.9  LOSS=  0.00
```

```
YEAR=14  Q=121.1
 CONGRESSIONAL CONSERVATIVES HAVE PERSUADED THE
 PRESIDENT OF THE NECESSITY FOR A BALANCED BUDGET AS A
 CONDITION FOR SUPPORT OF HIS NEW PROGRAMS.  CONSEQUENTLY,
 YOU SHOULD AIM FOR FULL EMPLOYMENT WITH A BALANCED BUDGET.
 YOU WILL BE PERMITTED TO CHANGE BOTH G AND T.  YOUR LOSS OF
 SCORE THIS PERIOD WILL BE-
        (G-T)**2+(Y-Q)**2   (**2=SQUARED)
 GCHANGE=
?-1.4←
 TCHANGE=
?1.4←
 CORRECTIONS (YES OR NO)
?YES←
 GCHANGE=
?-.7←
 TCHANGE=
?.7←
 CORRECTIONS (YES OR NO)
?NO←
 YOUR POLICY WOULD RESULT IN A LARGE LOSS.
 CHECK YOUR WORK AND RESUBMIT.
 GCHANGE=
?-1.0←
 TCHANGE=
?.8←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                      GNP ACCOUNTS  YEAR 14
 Q=121.1      Y=111.2      C= 66.6      I= 16.0       G= 28.6
 T= 29.0   G-T= -0.4      D= 82.2 SCORE= 63.9  LOSS= 10.00


YEAR=15  Q=124.8
```

```
YEAR=16  Q=124.8
 THE GOVERNMENT IS UNDER PRESSURE FROM LABOR GROUPS
 AND SENIOR CITIZENS TO INCREASE CONSUMPTION.S SHARE OF Y.
 YOUR TARGET IS TO INCREASE C BY 3 TO 69.6.  IN ADDITION.
OF COURSE. YOU SHOULD AIM FOR A FULL EMPLOYMENT GNP.
SQUARED DEVIATIONS OF C FROM THIS TARGET WILL BE DEDUCTED
 FROM YOUR SCORE.  YOU WILL BE PERMITTED TO CHANGE BOTH
 G AND T.  YOUR LOSS WILL BE-
        (C** 69.6)**2 + (Y-Q)**2
 GCHANGE=
?5.6←
 TCHANGE=
?-5.0←
 CORRECTIONS (YES OR NO)
?NO←
 YOUR POLICY WOULD RESULT IN A LARGE LOSS.
 CHECK YOUR WORK AND RESUBMIT.
 GCHANGE=
?5.6←
 TCHANGE=
?3.0←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                       GNP ACCOUNTS  YEAR 16
 Q=124.8      Y=124.6      C= 74.4     I= 16.0      G= 34.2
 T= 32.0   G-T=  2.2       D= 92.6 SCORE= 53.9  LOSS= 10.00
```

```
YEAR=17  O=128.5
 YOUR GOAL IS TO MAINTAIN THE CONSUMPTION SHARETARGETED
 FOR LAST YEAR, I.E. 0.56.  THUS C SHOULD BE 71.7.  YOU
 SHOULD AIM FOR FULL EMPLOYMENT AS WELL.  AGAIN YOUWILL BE
 PERMITTED TO CHANGE BOTH G AND T, AND YOUR LOSS WILL BE-
        (C- 71.7)**2 + (Y-O)**2
 GCHANGE=
?1.6←
 TCHANGE=
?.9←
 CORRECTIONS (YES OR NO)
?NO←
 YOUR POLICY WOULD RESULT IN A LARGE LOSS.
 CHECK YOUR WORK AND RESUBMIT.
 GCHANGE=
?3.6←
 TCHANGE=
?.9←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                      GNP ACCOUNTS  YEAR 17
 O=128.5      Y=136.3      C= 82.5      I= 16.0      G= 37.8
 T= 32.9    G-T=   4.9      D=103.4 SCORE= 43.9  LOSS= 10.00
```

```
YEAR=18  Q=132.4
 AGAIN YOU SHOULD MAINTAIN THE CONSUMPTION SHARE TARGET.
 IN ADDITION THE PRESIDENT WANTS A BALANCED BUDGET AND
 FULL EMPLOYMENT.  YOU WILL BE PERMITTED TO CHANGE BOTH
 G AND T.  YOUR LOSS WILL BE-
        (C- 73.8)**2 + (G-T)**2 + (Y-Q)**2
 GOOD LUCK.
 GCHANGE=
?10.6←
 TCHANGE=
?15.5←
 CORRECTIONS (YES OR NO)
?NO←
 YOUR POLICY WOULD RESULT IN A LARGE LOSS.
 CHECK YOUR WORK AND RESUBMIT.
 GCHANGE=
?10.6←
 TCHANGE=
?15.5←
 CORRECTIONS (YES OR NO)
?NO←

 DICK                      GNP ACCOUNTS  YEAR 18
 Q=132.4      Y=132.2      C= 67.8      I= 16.0      G= 48.4
 T= 48.4   G-T= -0.0       D= 83.8 SCORE= 33.9  LOSS= 10.00


EXPERTS FROM(THE BROOKINGS INSTITUTION, A WASHINGTON
 THINK TANK ON ECONOMIC POLICY, HAVE POINTED OUT IN A LETTER
 TO THE WALL STREET JOURNAL THAT SIMULTANEOUS ACHIEVEMENT OF
 THESE OBJECTIVES IS UNLIKELY.
 THE LOSS ASSOCIATED WITH YOUR POLICY IS 36.5.
 OPTIMAL POLICY OBTAINED BY TAKING A FEW DERIVATIVES,
 IS A G OF 43.1 AND A T OF 41.3.  THIS POLICY WOULD
 HAVE PRODUCED THE FOLLOWING RESULTS-
 C= 73.2  Y=132.4  G-T=  1.8  LOSS=  3.6


THIS ENDS USMCR1.  YOUR FINAL SCORE IS 33.9.
 YOU SHOULD NOW TYPE  K/F  TO LOGOUT.


 END ATTI3 7.0 SEC.

K/F←
ERR: K
BYE←
 ON FOR  1 HRS, 00 MIN, 09.3 SEC.
 C&E USE 1.2 SEC.
 EXECUTE 13.3 SEC.
 IO TIME 19.0 SEC.
 OFF AT   2:31 PM.
 GOODBYE U329003
09/06/77
```

5.4 Pre-Test of Macroeconomics Comprehension

1 Distribute to the students the answer sheets.

2 Ask the students to complete the information section of the answer sheet.

3 Distribute to the students the Pre-Test booklets requesting that they do not open them until told to do so. Then ask that they read the instructions on the first page. Explain that they have 25 minutes to complete the Test. Tell them to turn the page and begin.

4 Collect the test booklets.

5 Ask the students to check that their name and identification number are legible on the answer sheet.

6 Please collect and return the answer sheets together with the booklets.

1. As economists use the concept of "production," it is production:

   a) to raise wheat, but not to transport it.
   b) to build a house, but not to remodel it.
   c) to bake bread, but not to eat it.
   d) to manufacture a car, but not to run a used-car lot.

2. Of the following, which is the best definition of the economists' term "production?"

   a) creation of a good or service people are willing to pay for.
   b) intentional alteration of the form of a raw material.
   c) satisfaction of human wants.
   d) any combination of capital and labor.

3. Which of the following is the best definition of the concept "gross national product?"

   a) the utility consumers receive from their purchases in a year.
   b) the market value of final goods and services produced in a year.
   c) the nation's wealth.
   d) the wages paid for productive work done during a year.

4. In the national g.n.p. accounts, producers' goods like machinery, which are bought by businesses:

   a) are not counted as "product" because they are not "consumed."
   b) are not counted as "product" because they eventually are transformed into other "final" goods.
   c) are counted as "product" when they reach their final buyer.
   d) are only counted as "product" as they depreciate.

5. For a given company, "value added" is:

   a) the profit it makes on sales.
   b) the increase in value of its capital stock.
   c) the difference between its sales and the cost of its purchases of raw materials.
   d) the increase in the value of its inventories.

6. Adding up "value added" for all production units in the economy would give a figure equal to:

   a) gross national product.
   b) gross national income.
   c) total expenditure on final goods and services.
   d) all of the above.

7. Other things equal, if a corporation increases its dividend payments to stockholders:

   a) national income goes up.
   b) net national product goes up.
   c) personal income goes up.
   d) all of the above.

8. Suppose that in a certain country all production takes place in two firms, A and B, whose yearly sales, expenses and profits are given below. Firm A buys all its raw materials from B, and B buys all its raw materials from A.

	A	B
Sales	100	200
Raw Materials	50	30
Labor Costs	40	80
Depreciation	8	20
Profits	2	70

How large is gross national product in this country?

   a) 300
   b) 220
   c) 272
   d) 192

9. The term "real g.n.p." as contrasted with "dollar g.n.p." refers to:

   a) dollar g.n.p. corrected for price changes.
   b) the part of g.n.p. that is goods, as opposed to services.
   c) the part of g.n.p. that is really useful, not frivolous or wasteful production.
   d) dollar g.n.p. minus exports.

10. The value of national defense goods, such as bombs and bullets, that are produced in order to be used up in wars:

   a) is not counted in g.n.p.
   b) is counted as "consumption" in g.n.p.
   c) is counted as "government goods" in g.n.p.
   d) is subtracted from g.n.p.

11. In the basic theory of the determination of national income, the term "aggregate demand" is used to refer to:

   a) the amount of g.n.p. that could be produced if unemployment were zero.
   b) the combined expenditures of consumers, businesses and governments.
   c) the amount of demand that would arise for consumer goods if everyone had all the income he wanted.
   d) demand measured in the prices of some base period.

12. The basic determinants of the productive capacity of an economy are:

   a) aggregate demand and the price level.
   b) consumer, investor and government spending.
   c) labor skills, resources and the level of technology.
   d) the level of unemployment, and the frequency of depressions.

13. The "aggregate supply curve" for an economy shows:

   a) how much was supplied in past years.
   b) how much would be supplied at different levels of demand.
   c) how much would be supplied at different price levels.
   d) how much would be demanded at each level of capacity.

14. The theory of income determination says that if aggregate demand at present prices exceeds the capacity of the economy, prices will rise. And it says that if aggregate demand is below the capacity of the economy:

   a) prices will fall.
   b) aggregate demand will rise to capacity again in a short time.
   c) the capacity of the economy will shrink.
   d) there will be unemployment of men and factories.

15. Which of the following is the best definition of the term "inflationary gap?"

   a) the difference at full employment between aggregate demand and aggregate supply at current prices.
   b) the difference between aggregate supply at full employment and actual current aggregate supply.
   c) the difference between aggregate demand at full employment and actual current aggregate demand.
   d) the difference between current aggregate demand and current aggregate supply.

16. The central idea behind the "income-expenditures" theory of what determines the level of aggregate demand is that:

   a) income and expenditures will be determined by the level of aggregate supply.
   b) spending depends on incomes received.
   c) spending and incomes depend on the supply of money.
   d) income and expenditures are determined by economic growth.

17. In an economy which conducts no foreign trade and has no government sector:

   a) income equals consumption plus investment.
   b) saving equals income minus consumption.
   c) saving equals investment.
   d) all of the above.

18. $Y = C + I$
$C = 0.5Y$
$I = 50$

Suppose an economy can be represented by the above simple algebraic model. Then the equilibrium level of Y for this economy is:

a) 50
b) 100
c) 75
d) 200

19. In an economy with no government or foreign trade, it must be true that, in equilibrium:

a) consumption and investment are equal.
b) investment and saving are equal.
c) consumption and income are equal.
d) consumption minus saving equals investment.

20. $C = 100 + .8Y$

If the "consumption function" for an economy can be represented by the equation above, and if there is no government sector in the economy, then:

a) the amount saved is 20 if income is 600.
b) consumption is zero if income is zero.
c) consumption and income can never be equal.
d) people save less the higher their income.

21. According to the theory of national income determination, if businesses decide to raise their investment spending by $1 million, then:

a) g.n.p. will rise by $1 million.
b) consumption must drop by $1 million.
c) consumption and saving will both rise.
d) g.n.p. will probably not change.

22. In the theory of national income determination, the term "marginal propensity to consume" means:

a) the proportion of total income that is consumed.
b) the proportion of a small increase in income that is consumed.
c) the amount income will rise if consumption goes up.
d) the amount of an income increase that remains after taxes.

23. $Y = C + I$
$C = 10 + .5Y$
$I = 50$

In an economy represented by the model shown above, you would expect that if investment were to rise next year above 50, the increase in income that would result would be:

a) about equal to the change in investment.
b) about half of the change in investment.
c) about twice the change in investment.
d) negligible.

24. $Y = C + I$
$C = 100 + .9Y$
$I = 10$

In the economy represented by the above model, the size of the "investment multiplier" is:

a) 9/10
b) 10/9
c) 9
d) 10

25. In an economy with no government sector, saving must equal investment. In an economy with both private and government sectors:

a) saving must still equal investment.
b) taxes must equal government spending.
c) saving and taxes together must equal investment.
d) government spending on goods and services, minus taxes, must be equal to saving minus investment.

26. $Y = C + I + G$
$C = 50 + .75(Y - T)$
$T = 10$
$I = 20$
$G = 12$

In an economy like that above, where consumption depends on income after taxes:

a) a rise of 2 in G will have less effect on income than a rise of 2 in I.
b) the investment multiplier is 5.
c) if taxes and government spending both rise by 1, income won't change.
d) the investment multiplier and the government spending multiplier are equal.

27. The modern theory of income determination suggests that if investment spending suddenly goes up, threatening to cause too-high a level of aggregate demand:

a) a reduction in government spending can counteract it.
b) an increase in taxes can counteract it.
c) a decrease in consumption can counteract it.
d) all of the above.

28. In a consumption function of the algebraic form C = a + bY, if consumers always consumed 85% of income, regardless of its size:

a) a would be .85, and b would be 1.0.
b) a would be 1.0, and b would be .85.
c) a would be zero, and b would be .85.
d) a would be .85, and b would be zero.

29. As compared to consumption spending, investment spending can be characterized as:

a) larger in most years.
b) fluctuating more widely.
c) less important in explaining business fluctuations.
d) a more stable proportion of total g.n.p.

30. The difference between "gross" investment and "net" investment each year is:

a) net foreign investment.
b) spending on durable goods.
c) depreciation allowances.
d) the increase in the nation's capital stock.

31. The term "marginal efficiency of investment" means:

a) the going rate of interest.
b) the expected rate of return on new investment.
c) the cost of capital relative to the cost of labor.
d) the increase in output made possible by an increase in the capital stock.

32. On the basis of its usual definition, "money" in the modern U.S. economy consists:

a) about 20% of coins and paper currency, and 80% of demand deposits.
b) about 20% of coins, and about 80% of paper currency.
c) about 20% of savings deposits, and about 80% of demand deposits.
d) almost entirely of paper currency.

33. The basic control over the supply of money in existence is in the hands of:

a) people who deposit their money in banks.
b) the U.S. Treasury, which mints the coins.

c) banks, which establish demand deposits.
d) the Federal Reserve System, which controls the reserves that banks must hold.

34. Economists often argue that the amount of money people want to hold:

a) will rise if interest rates rise.
b) will fall if interest rates rise.
c) will rise if incomes fall.
d) will rise if prices fall.

35. If the government acts to stimulate g.n.p. by raising government spending without a tax increase, and if at the same time there is no change in monetary policy:

a) the predictions of the multiplier analysis, based on the income-expenditure model, will be substantially correct.
b) the rise in income may be smaller than the multiplier would predict, because demand for money will go up and interest rates will rise.
c) the rise in income may be greater than the multiplier would predict, because higher interest rates will stimulate investment.
d) income may not go up at all, because the money isn't available for increased spending.

36. The precise relation between increases in aggregate demand and price rises is unclear, but most economists agree that:

a) the main effect of increased demand is on prices, not output.
b) the first effect of increased demand is to raise prices, but later output goes up.
c) the effect of increased demand on prices is greater when the economy is near full employment than it is otherwise.
d) increased demand will usually both reduce prices and increase output, because firms' costs fall as output goes up.

37. If a bank has $1,000,000 in deposits, and $200,000 in reserves, and there is a legal reserve requirement of 20%:

a) it can make more loans in any amount it wishes, because reserves have to be held against deposits, not against loans.
b) it can make no more loans, because extending loans results in more deposits, which would violate the reserve requirement.
c) it can make a few more loans, if it does so by giving currency rather than deposits to the borrowers.
d) it can make no more loans, and in fact it must reduce them if anyone deposits any currency, since then it would be violating the reserve requirement.

38. Taking account of a 20% legal reserve requirement, and of the likelihood of adverse clearing balances, a bank with $1,000 in excess reserves would probably extend loans of about:

a) $200
b) $1,000
c) $3,000
d) $5,000

39. When the public withdraws currency from the banking system, assuming that the banks were "fully loaned up:"

a) new loans can be extended, because the withdrawals reduce deposits.
b) loans will stay the same, because the withdrawals reduce both reserves and deposits by the same amount.
c) loans must be reduced, because withdrawals will put banks below the legal reserve requirement.
d) nothing happens to loans, because currency withdrawals don't affect either deposits or reserves.

40. Which of the following items appears as a liability on the balance sheet of the Federal Reserve Banks?

a) U.S. government bonds.
b) member-bank reserves.
c) demand deposits of private citizens.
d) Treasury coins.

41. If the Federal Reserve System sells a government bond to a private individual (not to a member bank) the effect is to:

a) raise member bank reserves by about five times the amount of the bond.
b) raise member bank reserves by the amount of the bond.
c) not change member bank reserves.
d) reduce member bank reserves by the amount of the bond.

42. When the Federal Reserve raises member bank reserve requirements, say from 15% to 20%, the immediate affect is to:

a) increase reserves.
b) decrease reserves.
c) increase excess reserves.
d) decrease excess reserves.

43. It is fair to say that the powers of the Federal Reserve System to influence the size of the money supply are:

a) very small, because coins are issued not by the Federal Reserve, but by the Treasury.

b) very small, because the Federal Reserve Bank deposits are not part of the money supply.
c) very strong, because the Federal Reserve is the government's banker.
d) very strong, because it can create or destroy bank reserves in essentially unlimited amounts.

44. The public's demand for money balances to hold is likely to:

a) go up if income rises, or if interest rates rise.
b) go up if income rises, but down if interest rates rise.
c) go up if income rises, but be unaffected by interest rates.
d) be unaffected by changes in income or interest rates -- all that matters is Federal Reserve policy.

45. Two policies that the Federal Reserve might use if it thought aggregate demand should be increased are:

a) sell bonds in the open market, and raise reserve requirements.
b) buy bonds in the open market, and lower the rediscount rate.
c) raise the rediscount rate, and raise reserve requirements.
d) sell bonds in the open market, and raise the rediscount rate.

46. Banks as a group, at their own initiative, can increase the aggregate size of their reserves by:

a) selling government bonds to private persons.
b) borrowing from the Federal Reserve System.
c) borrowing reserves from other banks.
d) reducing their loans.

47. On the whole, statistics show that interest rates are high when the velocity of money is high. This fact is most nearly consistent with the idea that:

a) the interest rate is a measure of the cost of holding money balances.
b) velocity goes up when the supply of money goes up.
c) rapid growth in g.n.p. occurs when velocity is high.
d) banks "ration credit."

48. Which of the following factors is an important reason why banks will want to expand their loans and investments when the Federal Reserve acts to give them excess reserves?

a) they are legally required to expand loans if the Fed wishes it.
b) excess reserves are a non-interest-bearing asset for banks.
c) maintaining excess reserves is against the law.
d) if banks don't make use of the excess reserves, they fear that the Fed will remove them.

49. Other things equal, fiscal policy will produce a rise in g.n.p. if:

a) government expenditures exceed taxes.
b) government taxes exceed expenditures.
c) government taxes go up.
d) government expenditures go up.

50. Suppose a recession starts, and g.n.p. begins to drop. The effect of the g.n.p. change on the government's budget will probably be:

a) to move the budget toward surplus.
b) to move the budget toward deficit.
c) to decrease both revenues and expenditures by about equal amounts.
d) very little effect.

5.7 First Mid-Term - Macroeconomics

Answer all questions

1. Which of the following is the best definition of the concept "gross national product"?

   a. the utility consumers receive from their purchases in a year
   b. the market value of final goods and services produced in a year
   c. the nation's wealth
   d. the wages paid for productive work done during a year

2. If you were to add up all sales in the economy for a given year the result would:

   a. equal GNP for that year
   b. exceed GNP for that year
   c. be less than GNP for that year
   d. ignore consumers' valuation of the goods and services produced

3. In the national GNP accounts, producers' goods like machinery

   a. are not counted as "product" because they are not "consumed"
   b. are not counted as "product" because they eventually are transformed into other "final" goods
   c. are counted as "product" when sold to businesses or held in inventory
   d. are only counted as "product" as they depreciate

4. Which of the following is "investment" in the sense of the national income accounts?

   a. purchase of a car by a family
   b. purchase of a share of common stock in a corporation
   c. building of a new house by a family
   d. all of the above

5. The term "real GNP" as contrasted with "money GNP" refers to:

   a. money GNP corrected for price changes
   b. the part of GNP that is goods, as opposed to services
   c. the part of GNP that is really useful, not frivolous or wasteful production
   d. money GNP minus exports

6. Assume that consumers in a certain country buy only bread and cloth. The amounts and prices for 1960 and 1970 are as shown below. If we take 1960 as the base year, what will the GNP deflator be for 1970?

	Bread		Cloth	
	Amount	Price	Amount	Price
1960	1000	$0.15	50	$2.00
1970	2000	$0.16	70	$1.00

a. 78.3
b. 84
c. 88.6
d. 156

7. If the economy is at full employment, output must always expand if

a. potential GNP increases
b. unemployment increases
c. money GNP increases
d. none of the above is correct

8. Investment and technical progress

a. will raise labor productivity, but not potential GNP
b. will lead to unemployment, unless the labor force declines
c. makes possible higher levels of GNP per worker
d. all of the above are correct

9. When there is unemployment a decline in aggregate demand will lead primarily to

a. a decline in real GNP
b. a decline in the price level
c. a decline in potential GNP
d. a shift in the aggregate supply curve

10. Which of the following would explain why an increase in aggregate demand does not always lead to at least an equal increase in real GNP?

    a. Potential GNP is an upper limit to actual real GNP
    b. There is not a sufficient quantity of resources to produce all levels of real GNP
    c. Resource owners and firms may respond by raising resource and product prices instead of producing more output
    d. All of the above

11. Which of the following must be true if unemployment is increasing over time?

    1. Real GNP must be falling

    2. Potential GNP must be rising

        a. 1 only
        b. 2 only
        c. Both 1 and 2
        d. Either 1 or 2 or both

12. If an increase in potential GNP were accompanied by a less rapid increase in aggregate demand, which of the following would occur?

    1. An output gap would be created

    2. An inflationary gap would be reduced

        a. 1 only
        b. 2 only
        c. 1 or 2 or both
        d. Neither 1 nor 2

13. The reason that an increase in investment spending has a "multiplied" effect on income is best stated as

    a. investment spending raises the economy's capacity to produce
    b. investment dollars are more "powerful" than consumption dollars
    c. the new investment raises income, which in turn raises consumption and hence income again
    d. investments earn interest which raises income

14. C = 100 + .8Y

If the "consumption function" for an economy can be represented by the equation above, and if there is no government sector in the economy, then

a. the amount saved is 20 if income is 600
b. consumption is zero if income is zero
c. consumption and income can never be equal
d. people save less the higher their income

15. The equilibrium level of GNP - that is, the level at which output will tend to be stable - may occur when

a. there is less than full employment
b. the economy is operating at capacity
c. the economy is not operating on its production-possibilities frontier
d. all of the above

16. The relation between an autonomous increase in government spending on goods and services, and an autonomous increase in private investment spending, is that

a. they have similar effects on aggregate supply
b. they have similar effects on aggregate demand
c. investment has a "multiplier" effect, but government spending does not
d. private investment must equal saving; government spending must equal taxes

17. Government spending for goods and services, as compared to government spending for transfer payments

a. has the same multiplier effect
b. has a smaller multiplier effect, because it competes with private spending for goods and services
c. has a larger multiplier effect, because it increases both government and private demand for goods and services
d. has a larger multiplier effect, because sellers of goods to the government have a higher marginal propensity to consume than do recipients of transfer payments

18. The government can change the level of aggregate demand by changing

a. government expenditure
b. taxes
c. transfer payments
d. any of the above

19. If the gap between actual and potential GNP was $20 billion, and the marginal propensity to spend was .75, it would be possible to return to full employment if there were

a. a cut in taxes by $5 billion
b. an increase in transfer payments by $5 billion
c. an increase in government expenditure by $5 billion
d. any of the above

20. If the government increases its deficit spending during a period of full employment

a. unemployment will tend to result
b. inflation will tend to result
c. debt can be reduced
d. interest rates will automatically decline

21. If corporation profits tax rates rise, and other things stay the same, the rate of return on investment will

a. rise
b. fall
c. stay the same
d. fall now but rise later

22. Suppose that a new machine costs $200. Keeping the machine in good operating order will cost about $40 a year. If the machine is installed, it will produce added output worth $100 a year, and there will be added labor and materials costs of $20 a year. What is the rate of return on this machine?

a. zero
b. 20%
c. 40%
d. 50%

23. An investment expenditure is worth making if

a. it earns a positive rate of return
b. its rate of return exceeds the rate of interest
c. it earns a positive rate of interest
d. the rate of interest exceeds its rate of return

24. In order for a change in the quantity of money to change the level of aggregate demand, it is necessary and sufficient that

a. the demand for money depends on the rate of interest
b. the rate of investment depends on the rate of interest
c. both a and b be true
d. either a or b, but not both, be true

25. Two policies that the Federal Reserve might use if it thought aggregate demand should be increased are

a. sell bonds in the open market, and raise reserve requirements
b. buy bonds in the open market, and lower the discount rate
c. raise the discount rate, and raise reserve requirements
d. sell bonds in the open market, and raise the discount rate

26. Which of the following factors is an important reason why banks will want to expand their loans and investments when the Federal Reserve acts to give them excess reserves?

a. they are legally required to expand loans if the Fed wishes it
b. excess reserves are a non-interest-bearing asset for banks
c. maintaining excess reserves is against the law
d. if banks don't make use of the excess reserves, they fear that the Fed will remove them

27. In order to reduce unemployment it would be appropriate for the Federal Reserve to

a. reduce its holdings of securities
b. add to its holdings of securities
c. decrease its total liabilities
d. decrease its total assets

28. The faster a country's population grows, other things equal,

a. the faster its standard of living goes up
b. the more inflation it has
c. the faster its potential GNP rises
d. the less unemployment it has

29. Changes in which of the following factors need to be correctly forecast in order to formulate the proper monetary and fiscal policies?

a. Other factors affecting aggregate demand
b. Potential GNP
c. Both a and b
d. None of the above

30. If unit costs are expected to rise even though the unemployment rate is 6 per cent, fiscal and monetary policy cannot achieve

a. full employment
b. price stability
c. full employment with price stability
d. economic growth

31. If the economy is at full employment with price stability this year, it is likely, unless fiscal and monetary policy are adjusted, that there will be unemployment next year due to the usual

a. decline in aggregate demand
b. growth in potential GNP
c. rise in wages
d. decline in labor productivity

32. If technical progress leads to a rise in labor productivity of 5 per cent, a wage rate increase of 5 per cent implies that

a. workers will obtain all of the benefits
b. there will be cost-push inflation
c. unit labor costs will remain unchanged
d. profit per unit must fall

33. For any single country, running a persistent and sizeable excess of imports over exports for a period of many years

a. is not possible
b. is possible only if the country repeatedly reduces the international value of its currency
c. is possible if the country is a consistent international lender at the same time
d. is possible if the country is a consistent international borrower at the same time

34. Under a system of flexible exchange rates, the pound will fall in value in relation to the dollar if

a. the American demand for British products goes up
b. British prices and costs go up
c. American investors increase investment in stocks and bonds of British firms
d. the British government restricts the number of British tourists travelling in the U.S. by cutting travel allotments

35. Because money is an alternative to holding securities, the amount of money people want to hold

a. will rise if the interest rates rise
b. will fall if the interest rates rise
c. will rise if incomes fall
d. will rise if prices fall

5.8 **Final Examination - Macroeconomics**

Part A - Objective Questions

Answer all questions

1. A government has decided by how much to increase government expenditure to achieve full employment. A group of research economists discovered that on average the amount of income consumers were prepared to spend on domestically produced goods out of an additional dollar of income was lower than the government had anticipated and the amount they were prepared to spend on imported goods out of an additional dollar of income was higher than the government had anticipated. In order to achieve full employment, what would be the appropriate government policy, assuming fixed exchange rates?

   a. Greater government expenditure than originally planned.
   b. No change in government expenditure, since the changes would be offsetting.
   c. Greater government expenditure than originally planned only if the propensity to import changed more than the propensity to consume domestically produced goods.
   d. Greater government expenditure than originally planned only if the propensity to import changed less than the propensity to consume domestically produced goods.

2. Which of the following are sound reasons why a person might hold part of his wealth in the form of money even though money does not yield any interest?

   1. To avoid the costs of selling securities each time he wants to purchase a good.

   2. To avoid the risk of changes in the value of securities due to interest rate changes.

   3. To reap the gains from a revaluation upward of other nation's currencies.

      a. 1 only
      b. 1 and 2 only
      c. 3 only
      d. 1 and 2 and 3

3. To help reduce inflationary pressures in the United States, which of the following policies would be appropriate?

   1. Lengthening the repayment period on consumer loans.

   2. Increasing the down-payment requirement in the purchase of oncumser durables.

   3. The sale of securities by the Federal Reserve.

      a. 1 and 2 only
      b. 2 only
      c. 2 and 3 only
      d. 3 only

4. Which of the following must be true when inflation occurs and the economy is operating at less than full employment?

   1. Aggregate demand exceeds full employment output.

   2. Increases in wages or other income payments exceed factor productivity increases.

   3. The money supply is increasing at a faster rate than full employment output.

      a. 1 only
      b. 2 only
      c. 1 and 3 only
      d. 2 and 3 only

5. Which of the following would make possible higher living standards throughout the world?

   1. An increase in the skills of the labor force in each country.

   2. An increase in the stock of capital goods in each country.

   3. An increase in protective tariffs in each country.

      a. 1 only
      b. 1 and 2 only
      c. 1 and 3 only
      d. 1 and 2 and 3

6. When the economy is operating at full employment and also at full utilization of non-labor resources, which of the following will be inflationary assuming all other things unchanged?

1. An increase in labor productivity
2. An increase in exports

a. 1 only
b. 2 only
c. Both 1 and 2
d. Neither 1 nor 2

7. Which of the following could explain why a given increase in government expenditure does not always lead to a greater than equal increase in real national output?

1. There may not be a sufficient quantity of unemployed resources to produce such an increase in real national output.
2. Resource owners and firms may respond by raising resource and product prices instead of supplying such an increase in real national output.

a. 1 only
b. 2 only
c. Both 1 and 2
d. Neither 1 nor 2

8. If, in an economy operating at full employment, personal income taxes are increased, which of the following policy goals would likely be thwarted, other things being equal?

1. Full employment.
2. Decrease in the balance of payments deficit.
3. Decrease in the rate of inflation.

a. 1 only
b. 1 and 2 only
c. 1 and 3 only
d. 2 and 3 only

9. In response to a certain country's worsening balance of payments position, increasing inflation and rising unemployment, the government devalued the currency, lowered income taxes and increased the bank rate. What can be inferred about the government's attitude from its policies?

a. The government was more concerned about the deteriorating balance of payments than the rising unemployment
b. The government was more concerned about the rising unemployment than the increasing inflation
c. The government was more concerned about the deteriorating balance of payments than the increasing inflation
d. It is not possible to say about which problem the government was more concerned

10. The following table yields information on national income and the rate of growth in the market value of goods and services for three countries:

Country	National Income (billions of $ in 1977 prices)	Growth in market value of goods and services (percentage per year)
KU	160	3
Napaj	120	10
RSSU	500	6

Assuming that the growth rates will not change, which of the following can be deduced from the information given?

1. RSSU has a higher average living standard than KU.

2. Production in Napaj is more labour intensive than in KU or RSSU.

3. The stock of capital is increasing more quickly in Napaj than in KU or RSSU.

a. 1 and 2 only
b. 2 and 3 only
c. 1 and 2 and 3
d. Neither 1 nor 2 nor 3

11. "Since there is a limit to the amount of goods and services a nation can produce in a given year, any expansion of a nation's currency will mean a proportional diminution in its real value. One has only to look at the history of the pound Sterling to see that this is true; its purchasing power today is a mere fraction of what it was a few decades ago."

Which of the following is true? The quotation is

a. incorrect, since the exchange rate determines the value of a nation's currency
b. incorrect, since increases in the money supply may lead to increases in the output of goods and services
c. correct, since historically all money supply increases have been associated with corresponding price level increases in the U.K.
d. correct, since a nation's wealth or resources are in fixed supply at any point in time

12. "An economy at full employment experienced a sharp increase in aggregate demand as a result of a temporary increase in government expenditure to carry out a massive motorway construction program. As a consequence, the rate of inflation increased. After the construction program was completed, aggregate demand returned to its initial level, but the rate of inflation did not fall back to its initial level."

Which of the following could explain the high rate of inflation after aggregate demand returned to its initial level?

1. The inflation caused by the increase in aggregate demand changed expectations about future price increases.

2. One effect of the temporary increase in government expenditure was to create a larger supply of money.

a. 1 only
b. 2 only
c. Both 1 and 2
d. Neither 1 nor 2

13. Suppose that we had a fixed exchange rate system and that a drastic decline in the national income of all other countries led to a decline in this country's exports. Also suppose that in response to this the U.S. government increased the interest rate from 6 per cent to 10 per cent but made no other change in policy. What could be inferred about the U.S. government's attitude towards the change in economic conditions that would have resulted from the decline in foreign income? The government was

a. more concerned about the rising inflation than the deteriorating balance of payments
b. more concerned about the deteriorating balance of payments than the rising unemployment rate
c. more concerned about the deteriorating balance of payments than the rising inflation
d. more concerned about the rising unemployment rate than the deteriorating balance of payments

14. "The more money there is in the economy, the more people spend. The more people spend, the higher the national income. Therefore, the greater the supply of money, the better off people are."

Which of the following is true?

a. The statement is incorrect because more money in the economy does not usually lead to more spending
b. The statement is incorrect because real income is limited by the economy's capacity to produce
c. The statement is correct because an increase in spending can lead to an increase in income
d. The statement is correct because the amount of money in the economy determines how well off people are

15. Which of the following features must a good economics model have in order to help us understand the economy?

1. It must be completely realistic.

2. It must be simple enought to understand.

3. It must capture some essential feature of the economy.

a. 1 and 2 only
b. 1 and 3 only
c. 2 and 3 only
d. 1, 2 and 3

16. Which of the following explains why a decrease in the quantity of money will result in a rise in the rate of interest?

1. The quantity of money demanded decreases as the rate of interest increases.

2. The demand curve for money slopes downward from left to right.

3. The quantity of securities demanded increases as the rate of interest increases.

a. 1 only
b. 2 only
c. 1 and 2 only
d. 1, 2 and 3

17. Which of the following explains why considerable unemployment can exist in a market economy?

a. At full employment, national income is not always sufficient to purchase all output produced
b. Many product and factor prices respond very slowly when supply exceeds demand
c. The rate of productivity increase is not always great enough to permit sufficient growth of actual output
d. The growth of productivity capacity outstrips the growth of consumers' private wants

18. Which of the following explains why an increase in aggregate demand does not always lead to an equal increase in real GNP?

1. Potential GNP is an upper limit to real GNP.

2. There is not a sufficient quantity of resources to produce all levels of real GNP.

3. Resource owners and firms may respond by raising resource and product prices instead of producing more output.

a. 1 and 2 only
b. 1 and 3 only
c. 2 and 3 only
d. 1, 2 and 3

19. Is the analysis in the following statement correct or incorrect, and why?

"If we had a fixed exchange rate, our imports of goods and services would exceed our exports of goods and services by $4 billion. At the same time, capital investment abroad by United States residents would exceed foreign capital investment in the United States by $6 billion. Consequently, there would be a net inflow of gold and foreign exchange in the absence of any other foreign transactions."

a. Correct, because the inflow from foreign capital investment would exceed the outflow from the balance of trade
b. Incorrect, because whenever imports of goods and services exceed exports of goods and services, a country will have a balance of payments problem
c. Correct, because the net foreign capital investment would increase U.S. assets abroad by $6 billion, which would exceed the deficit in the balance of trade.
d. Incorrect, because the deficit in the balance of trade plus the foreign capital investment would cause an outflow of gold and foreign exchange.

Part B - Cases

Answer both questions

1. Many economists consider 1970-75 to be an unusual period in U.S. economic history. The following data are for key variables during this period:

	GNP (current prices, $ billions)	GNP Deflator (1958=1.00)	Unemployment (millions)	Labor force (millions)	Potential GNP (1958 prices, $ billion)
1970	977	1.35	4.1	82.7	768
1971	1055	1.42	5.0	84.1	799
1972	1158	1.46	4.8	86.5	831
1973	1295	1.54	4.3	88.7	864
1974	1397	1.70	5.1	91.0	898
1975	1499	1.85	8.5	94.4	933

Using this information wrtie an article for "Newsweek" magazine describing economic development in the United States during 1970-1975. Make sure you provide the reader with knowledge of what happened to the rate of change in labor productivity, the rate of unemployment, the rate of inflation, the output gap, and any other factors you feel are important. On the basis of your knowledge of the U.S. economy, explain in what ways this period can be described as being unusual.

2. Imagine that you were the economic adviser to the president of a hypothetical country very much like the United States. You have available to you the following data on the economy:

Year	Y	C	I	G	T
1	625	420	105	100	100
2	525	360	65	100	75

You may assume that G, T and I are independent of Y and that the rate of interest is constant throughout. You may also assume that retained business earnings and government transfer payments are zero. Finally, you may assume that the changes in I and T were the only autonomous changes from year 1 to year 2.

From the data you have compute the marginal propensity to consume and the I, G and T multipliers. What change in GNP from year 2 to 3 would you expect from an increase in I of 10? If potential GNP were equal to 725 in year 3, by how much would G have to change from year 2 to year 3 in order to have full employment in year 3? By how much would G and T each have to change from year 2 to year 3 in order to have full employment in year 3? Explain the economic reasoning behind your answers.

Part C - Essays

Answer both questions

1. One of the analytical concepts used by economists to explain real world events is the Phillips curve relationship. Much of the failure of economists, during the 1970s, to forecast accurately the rates of inflation and unemployment and of the inability of policy makers to maintain low rates of inflation and unemployment has been attributed to shifts in the Phillips curve. Explain what the Phillips curve is and why it exists. What factors might have caused the apparent shifts in the Phillips curve in the 1970s? If there were to be another dramatic shift in the Phillips curve, what policy response would you recommend?

2. In recent years, one issue that has been hotly debated is whether the government should rely primarily on fiscal policy or monetary policy to regulate aggregate demand. In this controversy, three positions have been taken: The "Extreme Keynesian" (or fiscal policy) position that when it is needed most monetary policy will be ineffective and only fiscal policy will work; the "Extreme Monetarist" (or monetary policy) position that fiscal policy will not work and only the supply of money matters in determining the level of aggregate demand; and the "Orthodox" or "Reasonable Man", position, which says that both monetary and fiscal policy can be effective.

   What are the sources of disagreement between the three positions taken? How in principle can they be resolved?